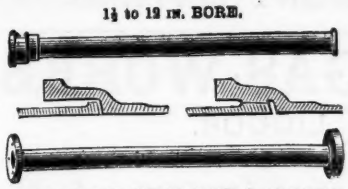
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXI. No. 1558.] LONDON, MARCH 21, 1893. [45TH YEAR. PRICE 6d.

GAS AND WATER PIPES

1¼ to 12 IN. BORE.



THOMAS ALLAN & SONS,

Bon Lea Foundry,

SOUTH STOCKTON-ON-TEES.

ALSO MANUFACTURERS OF

SANITARY & RAIN-WATER PIPES, HOT WATER PIPES, STABLE FITTINGS, RANGES, STOVES, And GENERAL CASTINGS.

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— ESTABLISHED 1830. —

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THE ONLY MAKERS OF

PATENT ANTIMONY PAINT,

Parker's Imperial Black Varnish,

Oxide Paints, Oils, and General Stores for Gas and Water Works.

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TORBAY PAINTS

Special Quotations to Gas Companies.

DARTMOUTH, DEVON.

Lanemark Coal Co.,

LIMITED.

LANEMARK CANNEL

AND GAS COALS.

Quotations and Analysis on application to

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NEW CUMNOCK, N.B.

Shipping Ports: All the principal Scotch Ports.

THE "C" BURNER.

NEW HIGH-POWER GAS-LIGHT.

INCANDESCENT GAS-LIGHT SYSTEM.

—o—

Consumes

4 cubic feet per hour.

Gives a light of

70 to 80 candle power.

Brilliant Light.

—o—

Perfectly Steady and

Noiseless.

Smokeless.

Reduced Heat.

Can be attached to any Gas-Fittings.

THE TRIUMPH OF GAS OVER ELECTRIC LIGHT.

Taking Gas at 3s. per 1000 cubic feet and Electric Light at 8d. per Board of Trade unit, the "C" Burner will produce an equal amount of light at **One-eighth the cost of Electric Light.** This cannot be disproved.

Prices and particulars on application to

THE INCANDESCENT GAS-LIGHT COMPANY, Ltd.,

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(Near St. James's Park Station.)

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GARRATT STREET WORKS, OLDHAM ROAD, MANCHESTER,

Manufacturers of

IMPROVED CONSUMERS' WET GAS-METERS

IN CAST-IRON CASES,

THE UNVARYING WATER-LINE GAS-METER,

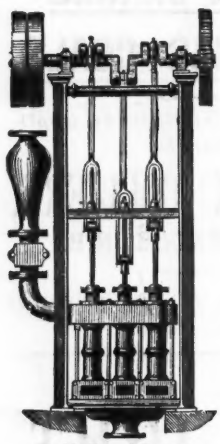
AND

IMPROVED DRY GAS-METERS.

SPECIALITY: PATENT CASH PREPAYMENT METERS.

STEAM & HAND PUMPS FOR GAS-WORKS,

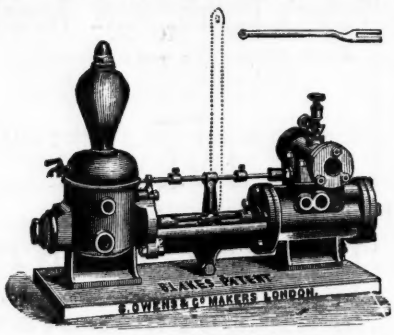
FOR PUMPING TAR, WATER, AND LIQUOR.



Treble-Barrel Pumps in Frame.

Syphon Pump.

Double-Barrel Force-Pump in Frame.



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20,000 IN USE.

Improved Double Action Pump.

Cast-Iron Hand-Pump.

Wrought-Iron Portable Pump.

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WITH RACK & PINION
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Gasholder Tanks.

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RETORT-BED FITTINGS,
And Retort-House Appliances
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Iron Roofs, Columns, Girders, Floor Plates and Tools, &c.

WROUGHT AND CAST IRON
CONDENSERS,
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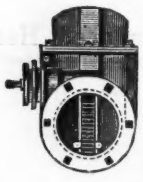
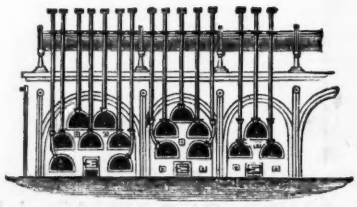
TAR AND LIQUOR PUMPS, &c.

PATENT
CENTRE VALVES
for working Purifiers.
Also Bye-Pass & Stop Valves.





PURIFIERS with Planed Joints,
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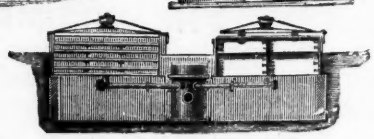
WOOD GRIDS.
CAST AND WROUGHT IRON TANKS AND CISTERNS.



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Pig Iron *(Special Quality)* for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

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Telegraphic Address:
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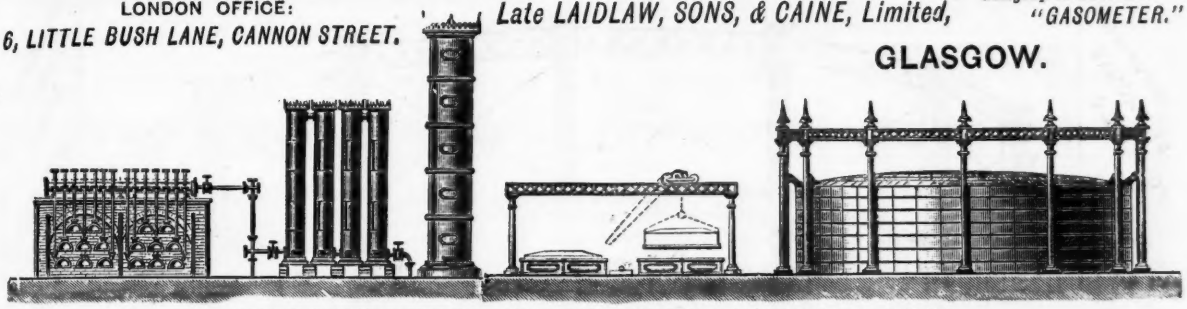
GLASGOW.



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RETORT-BENCH FITTINGS; SIEMENS'S REGENERATIVE AND ORDINARY FURNACES;
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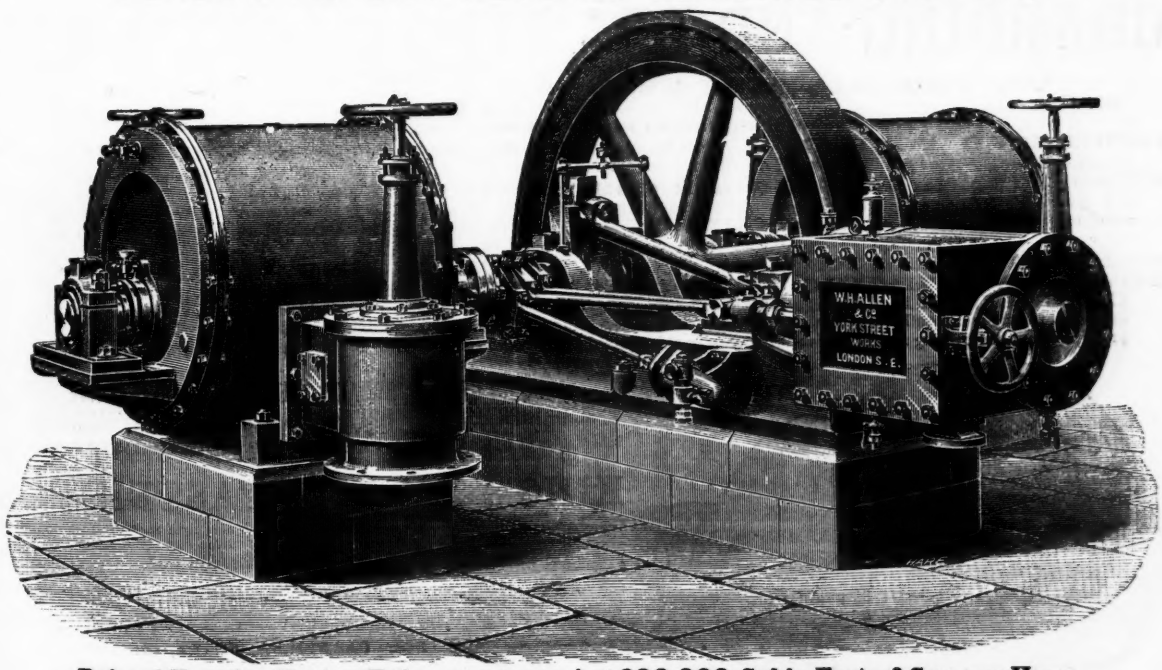
BEALE'S PATENT—ALLEN'S COMBINED SYSTEM.



Pair of Non-Oscillating Exhausters, passing 200,000 Cubic Feet of Gas per Hour.

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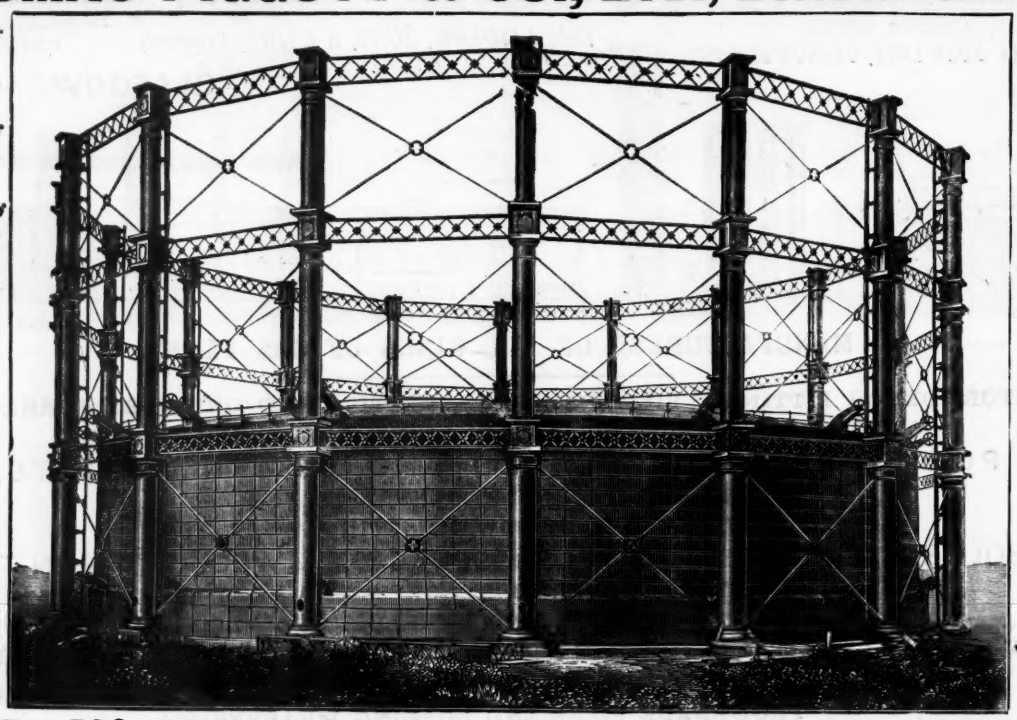
GAS PLANTS, BOILERS, ENGINES, PUMPS, ROOFS, RETORT FITTINGS, ETC.



TELEGRAPHIC ADDRESS: ATLAS, BIRMINGHAM.

WELDED & RIVETED PIPES, FOUL MAINS, RETORT LIDS, WROT & CAST TANKS, PURIFIERS.

OVER 500 GASHOLDERS HAVE BEEN SUPPLIED AND ERECTED,

INCLUDING THOSE SUPPLIED TO THE FOLLOWING GAS COMPANIES AND CORPORATIONS:

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BELFAST.	BOMBAY.	BRISBANE.	HARTLEPOOL.	LIVERPOOL.	READING.	STOCKHOLM.
BECKTON.	BRADFORD.	CARDIFF.	LEEDS.	NOTTINGHAM.	RIO GRANDE.	SYDNEY.
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WEST'S GAS IMPROVEMENT Co., Ltd.,

Engineers, Ironfounders, & Contractors,

ALBION IRON-WORKS, MILES PLATTING, MANCHESTER,

MANUFACTURERS OF

WEST'S PATENTED MACHINERY

FOR

CHARGING AND DRAWING GAS-RETORTS.

OVER **240** MACHINES AT WORK AND IN COURSE OF CONSTRUCTION.

Advantages attending its use are:—

INCREASED VOLUME of GAS per TON, and INCREASED YIELD per Retort.—The system of breaking and distributing the coals in an even layer in the retorts effecting more perfect carbonization.

REDUCTION in LABOUR and COST of WORKING.—In Works where this System of charging and drawing Retorts is adopted, there has been effected a substantial saving in the cost of Gas Manufacture in the Retort-House; the amount saved varying in different Gas-Works from **8 PENCE** to **15 PENCE per Ton** of coal carbonized. Full particulars will be forwarded upon application to W. G. I. Company, Limited.

MANUAL CHARGING AND DRAWING MACHINES.

POWER CHARGING AND DRAWING MACHINES, driven by COMPRESSED AIR, STEAM, or ROPE. The power machines are applicable to circular, oval, or ⌂-shaped retorts and mouthpieces, and are the most perfect, economical, efficient, and durable machines made. They are constructed on principles founded by long and extensive experience in this special branch of gas engineering and the manufacture of gas.

MAKERS OF COAL BREAKING, ELEVATING, AND CONVEYING MACHINERY, COKE BREAKING AND WASHING MACHINERY.

Sole Makers of CIRCULAR, OVAL, or ⌂-shaped MOUTHPIECES with Morton's Self-Sealing Lids, fitted with

KING'S PATENT FASTENINGS,

secure a very tight joint; and at the same time the eccentric motion given to the Lid effectually removes the Tar from the surfaces of the Joint.

N.B.—The whole of these Fittings are made of Wrought Iron. Several Thousands in use.

West's Improved Combined Regulating Liquor Seal Valve.

OXIDE ELEVATING MACHINERY, COKE BARROWS, VALVES, AND ALL GAS-WORKS PLANT, &c.

Illustrated Catalogue sent upon application.

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HYDRATED OXIDE OF IRON
FOR GAS PURIFICATION.

Two to three times as rich in Hydrate as Bog Ore.
STRONG ACTION ON SULPHURETTED HYDROGEN.
We have for sale Hydrate of Iron containing 77 per cent. of Ferric Oxide and 17 per cent. of Water. Directions given for mixing for Purifiers.
LESS THAN HALF THE PRICE OF BOG ORE.

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MANUFACTURERS OF
BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.
Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.
MANUFACTURERS OF GLASSHOUSE POTS AND CRUCIBLES OF EVERY KIND.
ESTABLISHED 1836.

GAS COAL.

BEST
REAL OLD SILKSTONE GAS COAL,
Address THE STRAFFORD COLLIERIES COMPANY,
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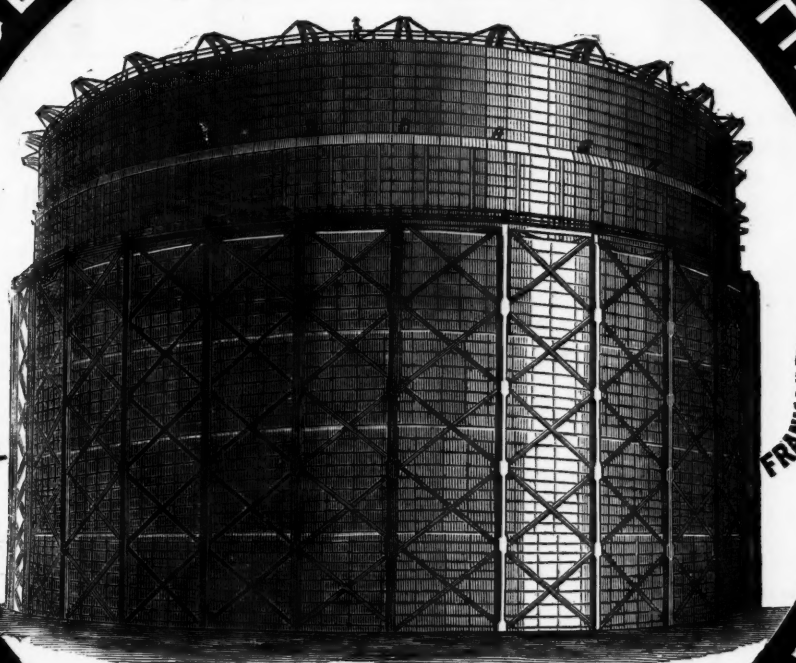
CLAYTON SON & Co LTD
MAKERS OF
WORKS LEEDS
THE LARGEST GASHOLDER IN THE WORLD.
GASHOLDERS OUR SPECIALITY



DESIGNED BY FRANK LIVESEY Esq.
CAPACITY 12 MILLION CUBIC FT.
ERECTED AT EAST GREENWICH FOR THE South Metropolitan Gas Company
IT HAS SIX LIFTS 30 FT DEEP EACH AND IS 300 FT DIAR

MAKERS OF GAS PLANT OF EVERY DESCRIPTION
ROOFS PURIFIERS &c. ALSO

ADDRESS LONDON 60, QUEEN VICTORIA ST.
TELEGRAPHIC "GAS, LEEDS."
GASHOLDERS OF ANY SIZE

ERECTED & COMPLETED WITHIN 12 MONTHS AND AT THE TIME SPECIFIED

Gas Lamps and Posts.

Several thousands of these are now in use, giving general satisfaction. They are strongly made, and of best material.

Patent Street Lamps.

NO PUTTY.

Lamplighters' Torches.

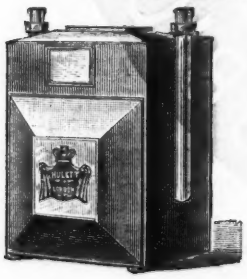
Lever Taps.

Lamp Governors.

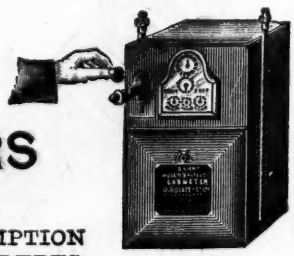
PRICE LIST ON APPLICATION.

SPECIAL HIGH-POWER LAMPS.

For Lighting Streets, Refuges, Promenades, &c., where a good light is required. Fitted with Porcelain cone, Copper top and perforation, Wrought-Iron Spray, Lever Tap, Burner and Patent Governor, glazed with Opal top.



GAS-METERS.



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(PRICE'S PATENT)

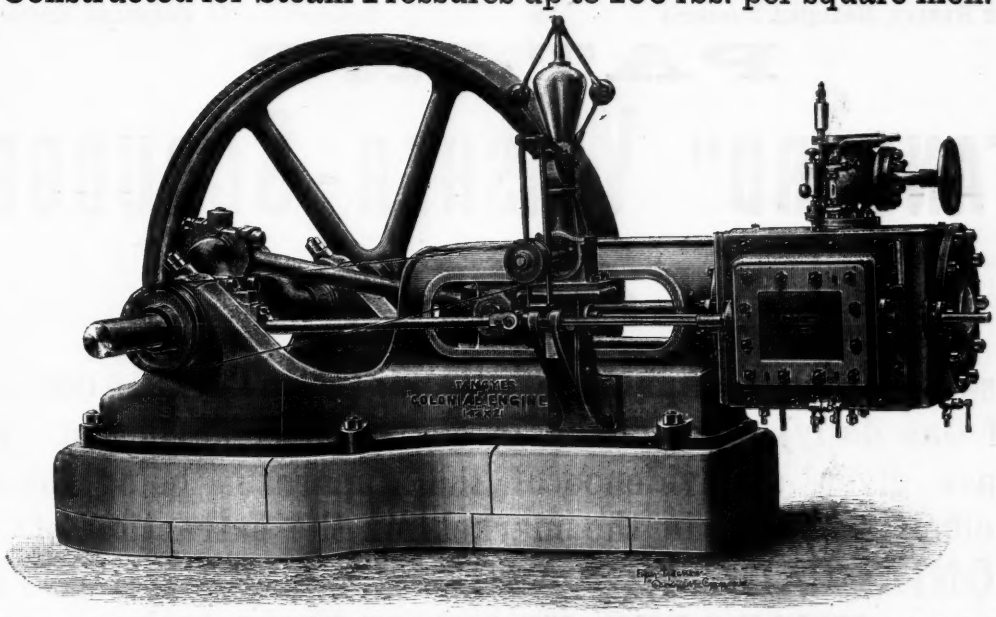
SPECIALLY ADAPTED FOR INCREASING CONSUMPTION AMONG SMALL CONSUMERS. NO RISK OF BAD DEBTS.

D. HULETT & Co., Ltd.,

55 & 56, HIGH HOLBORN, LONDON.

TANGYES'
"COLONIAL" STEAM-ENGINE

Constructed for Steam Pressures up to 100 lbs. per square inch.



Tangyes' "Colonial" Steam-Engine, with the TANGYE-JOHNSON PATENT AUTOMATIC CUT-OFF GEAR. From a Photograph of the 14½ in. by 21 in. size.

PRICES QUOTED ON RECEIPT OF THE NECESSARY DATA.

TANGYES LIMITED, Cornwall Works, BIRMINGHAM.

AND LONDON, NEWCASTLE, MANCHESTER, GLASGOW, SYDNEY, MELBOURNE, JOHANNESBURG, GENOA, BILBAO, AND ROTTERDAM.

Telegrams: "TANGYES BIRMINGHAM." *Copyright. Entered at Stationers' Hall. No. 69 E.*

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Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

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CHEAPEST! MOST ORNAMENTAL AND RELIABLE!

APPLY FOR NEW SEASON'S CATALOGUE.

THE WENHAM COMPANY, LTD. UPPER OGLE STREET, **LONDON, W.**

KIRKHAM, HULETT, & CHANDLER,

LIMITED.

(SIDNEY HERSEY, Managing Director.) (J. CHANDLER, Engineer.)

PATENT

"STANDARD" WASHER-SCRUBBER.

459

of these Machines (capable of dealing with 437,315,000 cubic feet of Gas daily) erected and in course of construction. These facts are given as evidence of the apparatus being the most efficient of any in the market for the extraction of

AMMONIA, CARBONIC ACID, AND SULPHURETTED HYDROGEN FROM COAL GAS.

A large number of the above Machines have been constructed according to the Company's latest Patent, which has also been applied to original pattern Machines at many Works.

TESTIMONIALS.

The Gaslight and Coke Company,
Horseferry Road, Westminster, S.W.,
Nov. 25, 1889.

MESSRS. KIRKHAM, HULETT, AND CHANDLER, LTD.,

Gentlemen,

In reply to your inquiry respecting the result of putting Wooden "Bundles" into some of the Washer-Scrubbers at our Beckton Station, I beg to say they have answered admirably for the few months they have been in; and I think them a decided success.

I am, yours truly,
(Signed) G. C. TREWBY.

NOTE.—Orders since received for four 3,500,000 cubic feet per day Machines for Beckton; and two 3,000,000 cubic feet for Kensal Green, also for Patent Improved Wooden "Bundles" for original pattern Patent "Standard" Washer-Scrubbers erected at Beckton, Nine Elms, Shoreditch, Pimlico, and Bromley.

Extract from the JOURNAL OF GAS LIGHTING, &c., for Sept. 27, 1892, referring to the visit of the Members of the Eastern Counties Gas Managers' Association to the Lowestoft Gas-Works—

"Mr. J. Ayris has one of Messrs. Kirkham, Hulett, and Chandler's "Standard" Washer-Scrubbers in operation (capable of dealing with 500,000 cubic feet of gas per 24 hours); and of the working of this machine he spoke very highly."

Estimates furnished for cost of altering original pattern Patent "Standard" Washer-Scrubbers, or for the supply of New Machines.

ADDRESS:—

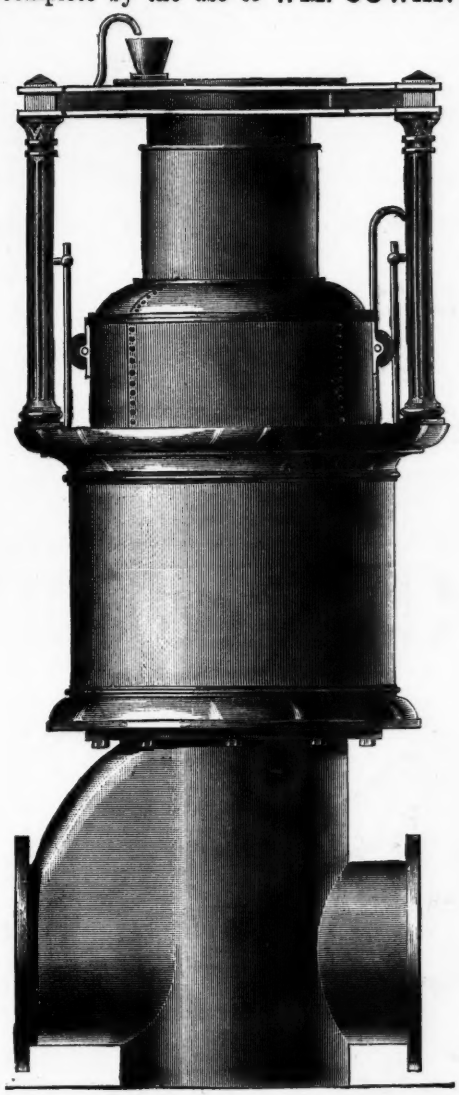
3 & 4, PALACE CHAMBERS, BRIDGE STREET, WESTMINSTER. S.W.

WM. COWAN'S PATENT GAS GOVERNOR.

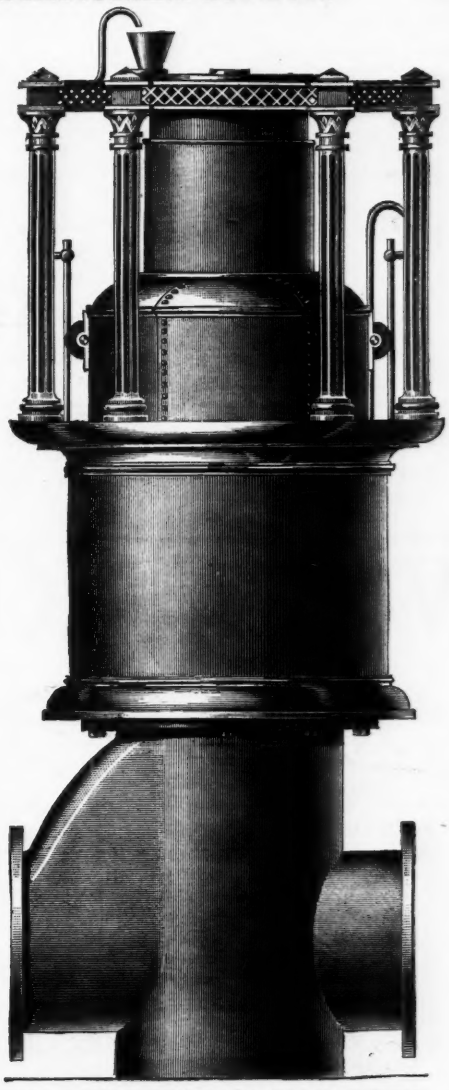
This Governor is a perfect regulator of gas pressure. Unaffected by **even the most extreme and sudden changes of inlet pressure or of draught,** it maintains, without variation, the pressure it is adjusted to give.

This result is attained by balancing the influence of the inlet pressure on the valve-base by an equivalent force, operating *above the roof of the bell.*

Another and a great advantage is the **unique water-loading arrangement,** which is made perfect and complete by the use of **WM. COWAN'S PATENT "STATIONARY SYPHON."**



STATION GOVERNOR with TWO PILLARS.



STATION GOVERNOR with SIX PILLARS AND GIRDERS.

The water loading is further utilized to maintain automatically the depth of the "seal" in the compensating slide. While the loading is going on, the water is first delivered into the slide, from which it overflows into the loading tank below.

We have supplied these Governors to many of the most important Gas-Works in the United Kingdom and abroad, to the Engineers of which we shall have pleasure in referring those who may favour us with inquiries.

W. & B. COWAN,

ESTABLISHED 1827

SMITH SQUARE WORKS, WESTMINSTER, LONDON, S.W.
TELEPHONE No. 3250.
"DISC LONDON."

DUTTON STREET WORKS, MANCHESTER.
TELEPHONE No. 1545.

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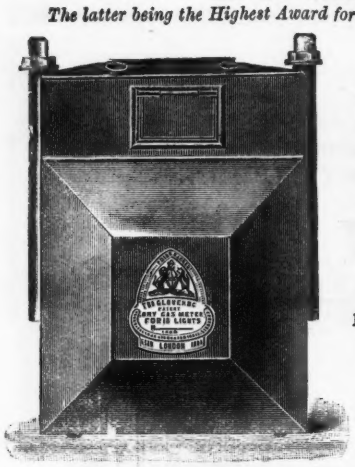
TELEGRAPHIC ADDRESSES:
"DISC MANCHESTER."
"DISC EDINBURGH."

[ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

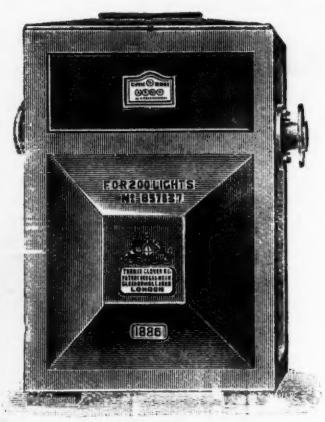
LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;
The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.



1st.—Are a remedy for all the defects of Wet Meters.
2nd.—Are suitable for all Climates, whether hot or cold.
3rd.—Incur no loss of Gas by Evaporation.
4th.—Cannot become fixed by Frost, however severe.
5th.—Are the most accurate and unvarying measurers of Gas.
6th.—Prevent jumping or unexpected extinction of the Lights.
7th.—May be fixed either above or below the level of the Lights.
8th.—Cannot be tampered with without visibly damaging the outer case.
9th.—Will last much longer than Wet Meters.
10th.—Will not cost more than one-half for repair that Wet or Water Meters do.

Are upheld for five years without charge.



Telegraphic Address: "GOTHIC LONDON."
Telephone No. 6725.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

BRISTOL: 62, VICTORIA STREET. *Telegraphic Address: "GOTHIC."*

BIRMINGHAM: 3, BRIDGE ROW, DERITEND. *Telegraphic Address: "GOTHIC."*

LEEDS: BOAR LANE CHAMBERS, 4, BASINGHALL STREET. *Telegraphic Address: "GOTHIC."*

MANCHESTER: 37, BLACKFRIARS STREET. *Telegraphic Address: "GOTHIC."*

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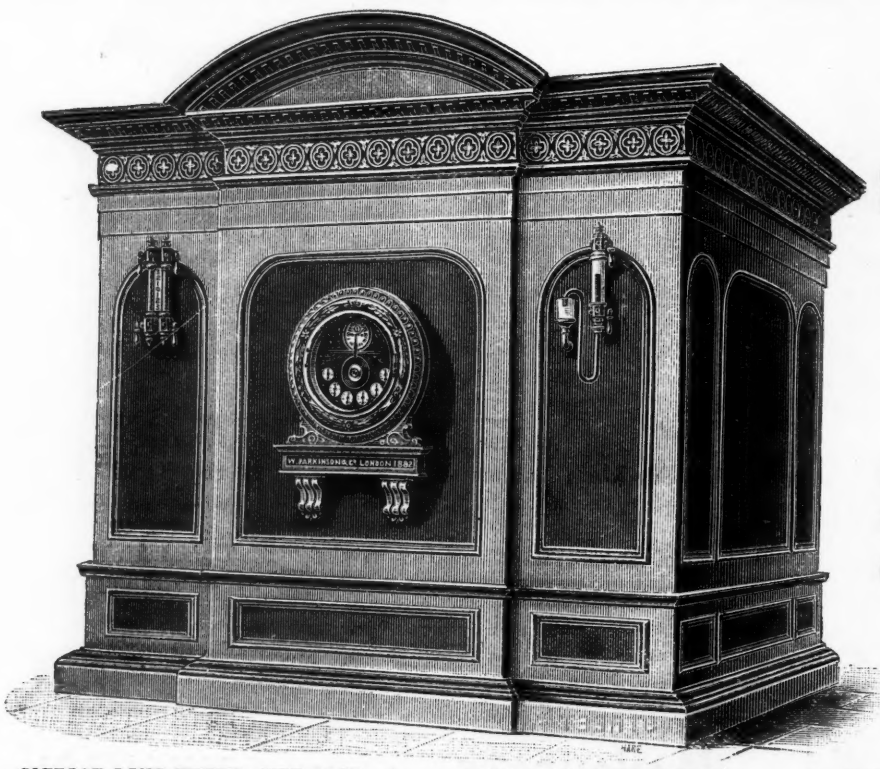

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COTTAGE LANE WORKS, CITY ROAD, **LONDON.** Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS, **BIRMINGHAM.** Telegraphic Address: "GAS-METERS."

10, MAWSON'S CHAMBERS, DEANSGATE, **MANCHESTER.** Telegraphic: Address "PRECISON."

[See also Advt., p. 528.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 21, 1893.

Progress with Private Bills.

PRIVATE Bill business has been going forward briskly in Parliament in the past fortnight. The most noteworthy measure dealt with, from our point of view, was the Ilkley Local Board Bill, which aimed at the compulsory purchase of the undertaking of the Ilkley Gas Company. This Bill passed the House of Commons last session, when we commented upon the position of the Company; and it came on last Tuesday week before Lord Hamilton of Dalzell's Committee—the Company still opposing. The compulsory acquisition of a Gas Company's property by a Local Authority is a strong step; and the promoters of the Bill evidently felt this, for they piled up their case against the Company in a manner which, having regard to the scale of the undertaking affected, almost oversteps the narrow line that separates the sublime from the ridiculous. Reduced to its elements, the case for the Local Board was simply that the Company had failed in their duty to the public by refusing to light a certain road, and had manipulated their accounts in a manner prejudicial to the interests of the consumers. Mr. T. Newbigging, on behalf of the Local Board, repeated to their Lordships the damaging charges against the management of the Company which had had such an effect upon the Commons Committee; but the defence was a little stronger on the present occasion. At one time, it looked as if the promoters meant to rely upon their ability to convict the Company of having acted with bad faith in the matter of their account-keeping; but eventually all imputations of the kind were withdrawn, which was doubtless very proper. It, however, materially weakened the case for compulsory transfer. Then, after three days' fighting, the parties came to terms; and the Company sold the works to the Local Board for an agreed price. This was obviously the best conclusion to the dispute. The conditions of the transfer will be found in another part of the JOURNAL.

The Bill of the Accrington Gas and Water Company has also been under the consideration of a Parliamentary Committee, being opposed by the Corporation of Accrington and several neighbouring Local Boards. This is a very ordinary Bill, such as all Gas Companies doing business in growing towns require to submit to Parliament from time to time. But the Local Authorities made a great fuss over it, and wanted to have a clause inserted enabling them to purchase the whole undertaking. Mr. Newbigging and Mr. Stevenson advised the Company; and Mr. Corbet Woodall ably led the opposition. No valid reason why the Company should be bought out was adduced for the guidance of the Committee, beyond the elementary one that the Local Authorities would like to get hold of the property. Surprising as it may be to the modern school of progressive municipalizers, who would fain invest Local Authorities with absolute power for carrying out their wishes, a plea of this kind does not go very far with a Committee of Parliament; and the petition against the Accrington Company's Bill was accordingly unsuccessful. In deciding to allow the Bill to go forward without a compulsory purchase clause, the Lords' Committee added an observation which may be taken to mean that in their opinion the question of the expediency of transferring the Accrington gas and water undertakings to the Local Authorities interested had better be raised on a Bill submitting a complete scheme of transfer and partition of the property, instead of on a proposal merely to interpolate a clause in the Company's Bill. This is a common-sense remark, bearing directly upon the subject lately discussed in the House of Commons, of the proneness of Local Authorities to incur expense in connection with Private Bill Legislation. The men who are moving spirits in such bodies are too apt to drag them into Parliament on every opportunity, instead of protecting the ratepayers by tactful husbandry. They seem unable to understand that if a statutory Gas Company must go to Parliament at intervals for permission to raise additional capital, purchase more land, or do any natural function of a growing undertaking, it does not follow that the Local Authority must seize the opportunity for endeavouring to wring out of Parliament something totally different. The evil is simply due to the unwisdom of many elective bodies in permitting themselves to be officer-ridden, or to be swayed this way or that by one or two headstrong members. The local press is no protection against extravagant action of this kind; because the newspaper reporters who manufacture and circulate what passes for public opinion do not understand the rights and wrongs of Private Bill procedure, and are as putty in the hands of a plausible lawyer.

Far be it from us to say that Local Authorities should not go to Parliament upon proper occasion. All that we mean to imply, by taking the Accrington opposition to the Gas Company as a text, is that a lot of money is wasted in these ill-considered conflicts, which so often arise through misconception of what appears to be an opportunity for obtaining something from Parliament. Many a Local Authority that would think twice or thrice about promoting a Bill specially for a certain purpose, will try to get a

clause to the same effect inserted in somebody else's Bill, and spend quite as much money over the attempt. Again, Town Clerks and Parliamentary Committees of Corporations save up all sorts of curious demands, which they stick into the first Bill that they can find a legitimate excuse for promoting. They would not go to Parliament specially for these notions, but being in the way of getting an Act for something else, they load up with all of them, and squander vast sums in attempting to get them through. So the merry game goes on; and the ratepayer has to find the money for all.

The Meeting of the Sheffield Gas Company.

THE half-yearly general meeting of the Sheffield United Gas Company has been held; and Sir Frederick Mappin, who presided, had a tale to tell that was satisfactory in so far as it related to the increased business done by the Company, and less so as regards the amount of profit made, and the experience of the Company in the matter of residuals. The undertaking has failed to earn the normal dividends; and consequently £3469 has had to come out of the reserve fund to make up the deficiency. This is not a serious sum, however; and there is reason to hope that the Company will recover themselves during the current half year. If we were disposed to perpetrate a pun with relation to such a grave subject as an official speech by Sir F. Mappin, we might say that tar is the Sheffield Chairman's *bête noire*. He confesses that the Company cannot make so much profit out of tar as he should like; and for an explanation of this trouble he flies again to the Horseferry Road, and calls upon the name of Colonel Makins. We may learn from the report of the Sheffield meeting how it was that Sir Frederick was prevented from attending the last Chartered meeting, and having with the Governor another round of that protracted and remarkable duel in which each combatant claims the victory. In view of what Colonel Makins had to contend with last month, however, Sir F. Mappin may well be content to reserve his further questionings of the Chartered administration for a future occasion. The Directors of the Sheffield Company are to be praised for the prudent use they make of the Provisional Order system when they require extended statutory powers.

The Eastern Counties Meeting.

THE members of the Eastern Counties Association of Gas Managers met in Cambridge on Wednesday last, under the presidency of Mr. W. Duesbury, Engineer and Manager of the Cambridge Gas Company, whose Inaugural Address will be found elsewhere. This composition does not deal with controversial questions, but is a plain statement conveying the results of fifty years' experience and observation of the conduct of gas manufacture upon a moderate scale. Almost everything Mr. Duesbury said will find an echo in the memories and thoughts of his colleagues and contemporaries; and it is very creditable to the Eastern Counties President that he does not close his mind to new impressions, but is apparently able and ready to graft upon an extensive experience any fruit of modern enterprise that commends itself to his judgment. The usual routine business was duly despatched; and it was agreed to hold the autumn meeting of the Association at Melton Mowbray. It is gratifying to be able to record that the members were made welcome to the most ancient and renowned city of Cambridge by the Town Clerk, in the name of the Mayor, who had granted the use of the Council Chamber for holding the meeting; and a letter of cordial greeting was also sent by the Chairman of the Gas Company (Mr. Dennis Adams), who was prevented by ill-health from attending the meeting in person. The gathering was, on the whole, a successful one; but we venture to suggest to the Committee that meetings of such an Association as the Eastern Counties might be made more profitable if steps were taken to render the technical proceedings more generally interesting than they are when time is taken up by the reading of uninstructive papers. A conversational discussion upon some common and familiar topic is to be preferred to the "one-man" exhibition that is sometimes inflicted upon the members of technical societies under the "paper" system, which is difficult to work with assured success when the field of possible contributories is limited. These reflections, which we offer in all good faith to the Committee, and with a sincere desire for the continued attractiveness and usefulness of the meetings of the Association, have been pointed by the circumstance that on the present occasion, through lack of supervision or some other regretable cause, a paper was allowed to be read that has since been suppressed as unsuitable for inclusion in the Transactions of the Association, as it certainly was for publication in our columns. Thus not only was the time of the meeting wasted, but the reputation of the administration of the Association received injury which it may take some years of prudent management to repair.

A Lesson and a Warning.

THE trial and sentence of "Monte Carlo Wells" have of late attracted much attention; and all the newspapers circulating the length and breadth of the United Kingdom have been full of the doings of this accomplished swindler, the sorrows of his dupes, and the moralizings that such a striking tale of real life so easily evoke. We mention the subject here because the moving history of this *soi-disant* Engineer and Patent Agent throws some light upon two aspects of patents and the profession of engineering which have been discussed several times in these columns. It was testified by the unfortunate woman Wells robbed of £20,000 that she was induced to place confidence in the unknown schemer because he used the letters "C.E." after his name. It is difficult for men of business and of the world to appreciate the force of this kind of attraction; but the statement comes very opportunely after what has lately been urged by Professor Tilden and others, with our full concurrence, about the objectionable use of meaningless letters after men's names. It would hardly have occurred to Professor Tilden or to any other sensible man that the absurdity of tacking the letters "C.E." to a surname would produce the effect sworn to in the case of Wells; but facts sometimes transcend the range of imagination. Let us hope, however, that the spirit of pretentiousness, or whatever it is, that induces men who would like to be regarded as Civil Engineers to write "C.E." after their usually obscure, if honest patronymics, will be exorcised by this example of the Monte Carlo notoriety. Henceforward it will be impossible to see these letters without thinking of Wells; and the association of ideas is hardly one that an honourable member of the community will care to evoke in connection with his own signature, so that we have good hopes of having seen the last of a silly trick. The other point that we desire to bring forward here is the perfect ease with which this swindler was able to exhibit, to people presumably sane, the Patent Office as a kind of "Tom Tiddler's ground," where those who paid a moderate entrance fee might walk about "picking up gold and silver" *ad lib.* It is this aspect of patents as "lucky-bags" that is foisted on people by the publications of some advertising agents. It is true enough, as one newspaper has argued, that the stupendous promises made by Wells to all and sundry ought to have aroused suspicion; and that the cupidity which caused a certain number of fools to pay £1000 down for the prospect of gaining a quarter of a million or more, originates in the same overreaching spirit that provides the manipulators of the "confidence trick" with an unfailing store of victims not one whit more honest in intention than themselves. But when one patent agency journal that we could name proclaims the "genius" of the patentee who, by making a lucky hit with a patent grease-proof hatband, is enabled to collect a princely income from all the hatters of the United States, who shall say that Wells stood alone in his way of exploiting the Patent Law? What is it besides the desire to get rich quickly that drives most inventors of "notions" into the Patent Office? Truly, the moral of the Wells frauds is worth thinking over, especially by such as feel with disgust that the man was a hanger-on upon their own profession.

Suspicions Concerning the New Labour Department.

THE satisfaction which we, in common with many other organs of industrial opinion, felt at the announcement that the Government intended to largely increase and develop the Labour Department of the Board of Trade, has been considerably dashed during the past week or two by what has leaked out through the inquiries of certain Members of Parliament as to the character of the appointments made in connection with the new *Gazette*, which is to be published with a view to the dissemination of reliable information upon the state of trade, wages, &c., in different parts of the kingdom. It was announced by the President of the Board of Trade that special correspondents of this

proposed Government journal would be appointed for all the principal centres of industry, whose reports would tell workpeople and employers generally more about the condition of various trades than can usually be gleaned from the newspapers. These communications were, in short, to be market reports, only the market would be that for trained and untrained labour instead of tangible merchandise. Now, statements of this kind, as newspaper editors and readers know full well, depend for their value wholly on the manner in which they are made. Accuracy, impartiality, completeness, are of the essence of their worth; and the existence of the faintest suspicion that they are likely to be "cooked," one-sided, or vitiated by the suppression of facts inconvenient to the views or desires of the compilers, destroys the reputation not merely of the reporters, supposing them to be known, but also of the publication which gives currency to their misleading statements. This being the veriest commonplace of newspaper management, it is decidedly disappointing to hear that all, or nearly all, of the appointments to correspondentships under the new Labour Department have gone to the noisy, mischievous party of the New Unionists—that is to say, to Socialists, Social Democrats, and Fabians. It is alleged that these appointments have been made a means of endowing with welcome funds some of the most reckless agitators in the towns selected for this kind of patronage; and it is hardly necessary to ask how far regard for truth is likely to weigh with men of this stamp when it comes to be a question of reporting the outbreak or termination of labour troubles fostered by themselves. Indeed, unless the new *Gazette* is to be filled with the rubbish about banner unveilings and harmony meetings at public-houses with which the Labour newspapers delight their readers, it is difficult to understand how New Unionists are to "make copy" without patently telling a one-sided story. It is to be hoped that these damaging rumours are exaggerations, and that the New Unionism, which is the same thing as the Independent Labour Party, has not captured the Board of Trade. But we are by no means confident on the subject; and we shall scan the *Gazette*, when it appears, with much curiosity sharpened by the suspicion that the demagogues will be represented by it more largely than honest workers.

Mr. A. H. Neve has been elected Auditor of the Tunbridge Gas Company, in lieu of Mr. E. Wheatley, who has retired.

The Appeal in the Gadd Case.—In the JOURNAL for the 7th ult., we announced that the appeal to the House of Lords, by the defendants in the above case, against the judgment of the Court of Appeal, as given in our "Legal Intelligence" on Nov. 8 last year (p. 818), had been presented, and that Messrs. Gadd and Mason had been ordered to lodge a printed case in answer thereto on or before the 16th inst. This was accordingly done; and the appeal has been set down for hearing.

The Rejection of the East London Water Bill.—In our "Parliamentary Intelligence" to-day is recorded the rejection of the East London Water Bill on Friday last, on the motion for its second reading in the House of Commons. The minority which supported the motion was composed of 115 Conservatives, 27 Gladstonian Liberals, and 12 Liberal Unionists—total, 154. The majority against the Bill was made up of 119 Gladstonian Liberals, 51 Anti-Parnellites, 5 Parnellites, and 3 Conservatives—total, 178. It will thus be seen that it was by the aid of the Irish votes that the Bill was thrown out.

The Origin of Petroleum.—Many theories have been put forward to account for the origin of petroleum. Mendeléeff considers it had been formed by the decomposition of a carbide of iron by steam—ferric oxide and a hydrocarbon being produced; Sokoloff, by a combination of carbon and hydrogen; Ross, by the reaction of sulphuretted hydrogen and calcium carbonate; Daubrée, by the decomposition of vegetable matter. Now M. Engler is inclined to consider it is produced by the decomposition of animal substances. It seems that it is possible to obtain petroleum by distilling animal matter under pressure.

Institution of Civil Engineers.—The annual banquet of this Institution was held last Saturday evening in the hall of the Middle Temple, by the kind permission of the Benchers—the President (Mr. Harrison Hayter) in the chair. The toast of the evening—"Prosperity to the Institution of Civil Engineers"—was proposed by Lord Norton, who, in the course of his speech, said it had become the national Institution for the promotion of mechanical science and art, and it was singularly coeval with this century of mechanical invention. This country was indebted to the Institution for the first organization and training of professional knowledge to enlist the current discoveries of the powers of Nature in the service of man. The President, in reply, referred to the work of the Institution; and assured his hearers that it had only one object—viz., the healthy progress of the human race and the advancement of civilization.

WATER AND SANITARY AFFAIRS.

THE rejection of the East London Water Bill in the House of Commons on Friday last, on the motion for the second reading, shows, in a remarkable degree, the extent to which Parliament can allow itself to be overborne by designing parties skilled in the exercise of those arts which compass petty ends regardless of the public good. The Bill proposed that the Company should have power to raise half a million of money in the form of debentures, bearing a low rate of interest; provision thus being made for furnishing the requisite supply of water to a growing district outside the Metropolitan area. The population of the district had risen from 200,000 in 1881 to 364,000 in 1891; and a sum of £140,000 was to be laid out in new mains. Full particulars of the works on which the money was to be expended had been supplied to the County Council more than a month before the second reading came on. As for certain clauses in the Bill to which the Council might take exception, these were capable of being dealt with in Committee. The principal objection lay against the proposal that water-fittings should in future be stamped; and this point, Mr. Banbury stated in the House on Friday, was one which the Company were quite prepared to surrender. What plea, therefore, had the Council to go upon as against the Bill? In the first place, it was urged that the measure was premature, as the report of the Royal Commission on the Metropolitan Water Supply had not yet appeared. We know how little weight was attached to such a consideration when the County Council and the Corporation joined hands to push forward the London Water Bill of last session. But the wants of the outlying district will not be suspended by anything the Royal Commission may say; nor can any fresh source of supply be brought into action for years after the expected report appears. Whatever the Royal Commissioners may recommend, there can be nothing in their report to dispense with the necessity for giving people water to drink and to use as time goes on. Mr. Benn stooped to such "excellent "fooling" as to declare that there could be no urgency in the matter, seeing that the East London Company had declared its ability to furnish water adequate in quantity and excellent in quality for forty years to come! But could Mr. Benn or anybody else suppose that the East London Water-Works were sufficient for the next forty years? Water there may be, and doubtless is; but it must be fetched and distributed, and this costs money. Wells, adits, pumps, reservoirs, mains, and pipes are not natural products. The idea of a cholera visitation was ridiculed. Yet, if houses are found without water, the law declares them to be a nuisance, and sanitary authorities denounce them as fraught with peril to the public health.

Mr. Benn condemned the East London Water Bill as being "not philanthropical, but financial." Yet, while necessarily financial, the Bill was decidedly beneficial in its bearing on the health and comfort of the community. What was the character of the opposition? Was that not eminently financial, and at the same time prejudicial to the public good? The declared policy of the County Council was to prevent any possible increase in the value of the Company's property. The word "purchase" was boldly uttered; and the Council wanted to buy cheaply. Mr. Boulnois denounced this miserable device; and the Chairman of Committees (Mr. Mellor) warned the House of the "very grave responsibility" that would be incurred in rejecting the measure without inquiry. The arguments in favour of the Bill, or at least for referring it to a Select Committee, were so strong, that some members previously opposed to it declared their intention of voting for the second reading. But the wire-pullers had done their work. The *Daily Chronicle* is candid enough to tell us that "Mr. Burns, carrying out the valuable *entente* between "Celtic and Saxon democracy, whipped up Irishmen "and Welshmen into the lobby;" and as a consequence the Bill was lost by 24 votes, or really by only 22—Colonel D. Palmer unintentionally voting with the noes instead of the ayes. The *Daily Chronicle* proclaims the result in big letters as "A Triumph for London." The *Standard*, on the other hand, calls attention to the fact that the Bill was thrown out "mainly by help of the Irish vote," and asserts that "the majority of the London members "present were in favour of the second reading." In like manner, the *Pall Mall Gazette* observes that, in this instance,

"a purely London question is actually defeated by the aid "of the very members who want to get Home Rule for "Dublin." As for the merits of the case, of course they are nowhere. The County Council had determined to wreck the Bill, and made alliance right and left for the purpose. Mr. Stuart, in moving that the second reading should take place that day six months, might have spared himself the trouble of citing figures, to which a reply can very readily be given. He finished with a reference to "purchase;" and it is evident that here we find the real secret of the whole opposition—the one consideration which excited the wrathful antagonism of Spring Gardens. But what has created this lively impression that, as Mr. Benn put it, "purchase must come sooner or later"? At one time such a contingency was looked upon by the Council as something to be safely disregarded. It is now accepted as inevitable; and the "competing supply" is a forgotten phrase.

Dr. E. Frankland's report on the Metropolitan Water Supply for the month of February is of unusual length. It shows that there was less organic impurity in the New River supply than in that of the Colne Valley. Contrasted with the raw river water, the supplies of the five Companies drawing from the Thames showed a very marked improvement bacterially; the elimination of bacteria by the Chelsea Company going as high as 100 per cent. The West Middlesex supply was not far behind; the reduction being 99·94 per cent. Except in one instance, all the reductions were above 99 per cent. Bacterially the supply taken by the New River Company chiefly from the Lea was improved bacterially 98·26 per cent. The East London supply showed an improvement of 98·98 per cent. Independently of filtration, the effect of storeage is very marked in the reduction of bacteria. The bacterial purity of the water drawn by the Southwark Company from the gravel beds was in marked contrast to the raw Thames water, though we can hardly agree with Dr. Frankland when he says it was of "much" better quality than that delivered by any of the three filters of the Company. The difference between 99·86 per cent. and 99·61 per cent. does not appear so very large. However, great credit is due to Dr. Frankland for the care and completeness with which he has drawn up his report. At the present time, all trustworthy information on the subject is of especial value.

Cannel Coal in Flintshire.—In the JOURNAL for July 21, 1891, we gave some particulars in regard to a new seam of cannel which had just been discovered near Mold by Messrs. S. Chandler and Sons. We learn that great rejoicings have been caused throughout the Leeswood Colliery district of Flintshire by the announcement that the firm have succeeded in driving into the cannel seams in their second adit. They are stated to be 4 ft. 6 in. thick.

Advance in Salaries in the Manchester Gas Department.—At the meeting of the Manchester City Council last Wednesday, the following advances in salaries were made on the recommendation of the Gas Committee: Mr. W. Rodger, Manager of the Bradford Road works, from £230 to £280 per annum; Mr. J. Merrill, Deputy-Manager of the Gaythorn works, from £182 to £200; Mr. J. R. Hill, Assistant-Manager of the Rochdale Road works, from £163 16s. to £180.

The Lanarkshire Coal-Fields.—In a lecture recently delivered in Glasgow by Mr. Moore, who has devoted considerable attention to the coal district of Lanarkshire, he stated that in 1845 the total quantity of coal raised in Scotland was estimated at 4 million tons, towards which Lanarkshire probably contributed about one-fourth. In 1891 the total for Scotland had risen to 25 million tons, of which 14 million tons, or more than half, were raised in Lanarkshire. Mr. Moore estimates that in the upper group of coal measures in Lanarkshire the amount of workable coal is about 933 million tons. From this figure he deducts 668 million tons, his estimate of the amount raised to date; leaving unworked a total of 265 million tons—a quantity which, on the assumption of an annual output of 11 million tons, will be entirely exhausted in 24 years, in so far as cheaply-worked coal is concerned. The continuation of the supply after that time will be required to come from the seams under the virgin coal. Taking all circumstances into account, Mr. Moore estimates that 1000 million tons will be found in the Lanarkshire lower seams, the lowest of which would be 370 fathoms from the surface at Newton. Allowing for an increase of 2 per cent. per annum for the next 20 years, the whole coal measures in the district would be exhausted in about 60 years. The only seams then remaining in Lanarkshire would be those that might be found in the carboniferous limestone series. At Hamilton the depth to the first of these seams would be some 450 fathoms; the deepest being from 600 to 700 fathoms.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 517.)

THE main features of the past week in the Stock Exchange were very similar to those which characterized its predecessor. Transactions generally in all the principal markets continued to be restricted to a volume far below the average degree of activity; and movements in value are few and slight. The settlement of the long nineteen-day account was the chief thing; and it was not effected without difficulties. The tendency in rails and in Americans was rather more favourable; but nothing has stood particularly well except the high-class investment stocks, the demand for which is unabated. The Money Market shows no change; and probabilities still point to a continuation of cheap money. The Gas Market, though perhaps not quite so active as in the preceding week, has been very fairly busy; and the general tendency was in favour of firm prices. There are very few changes in quotations, and they are slight in extent; but, with one exception, they are in the upward direction. Gaslight "A" continues to be freely dealt in at extremely steady figures—never rising or falling more than half a point above or below 224, except in one "special" bargain on Saturday last, when 225 was attained. The secured issues—debenture, preference, and maximum—continue active under the sustained demand for investment stocks, and have changed hands at good figures, but without any advance in the nominal prices. South Metropolitans were very quiet at first, but became more animated towards the end. Movements were irregular—the "B" receding, while the debenture stock advanced. Commercials have been more active, especially the old stock, which realized on Thursday 250, the top price. But the quotation was left unchanged. Moderate dealings in the Suburban and Provincial undertakings reveal a firm tendency in general; and in more than one instance *ex div.* variations of quotation show a balance in favour of the stock. A fair amount of business was done in Continentals; prices being good throughout, especially for Imperial. Quotations, however, rest unchanged. Other undertakings offer no feature calling for special remark. The Water Companies show increased activity, and a favourable tendency in general though only two issues have actually advanced.

The daily operations were: Gas opened steady on Monday, and remained quiet and unchanged throughout. In Water, Southwark and Vauxhall was 1 better. Tuesday exhibited no variety from the previous day; business being quiet, at the old prices. Wednesday produced greater activity, especially in secured stocks; and several issues figured better *ex div.* British was erroneously put down 1; but the error was promptly remedied the next day. Thursday was the counterpart of the preceding day; prices being good, but not higher. Chelsea Water was quoted 2 better. Business was rather quieter on Friday. South Metropolitan "B" was lowered 1; but the debenture stock advanced 1. Saturday was more active than usual; and all quotations closed unchanged, except for a drop of 1 in South Metropolitan "B."

ELECTRIC LIGHTING MEMORANDA.

Professor Kennedy on the Electric Lighting of Belfast—The Electric Light in Birmingham—The Affairs of the Chief Hammond Company—Electric Light and Garbage Destruction in Shoreditch.

PROFESSOR KENNEDY has furnished the Belfast City Council with an exhaustive report upon the proposed Electric Lighting of the city. We have repeatedly remarked upon the difficult position in which the Belfast authorities have been placed by the local agitation that has arisen over the coincidence of the demand of the Gas Committee for widely-extended powers, and the project for a municipal electric light supply. A noisy party in the town, aided by a portion of the local press, has endeavoured to put the two schemes of gas-works extension and electrical supply upon the footing of equivalent alternative provisions for meeting the requirements of the population in the matter of lighting. This nonsensical idea has been exposed in these columns; and we are gratified to find that Professor Kennedy, whose common sense has not been altogether swamped by his enthusiasm for electrical science, takes the same view of the subject as we do. He shows conclusively that in Belfast, as in other large and wealthy cities, there exists a central district in which a market for electric lighting may be found. Outside this area, in which all the first-class shops, clubs, banks, and principal business establishments are collected, there is a ring covering the industrial part of the city; and he does not think there would be much demand for electric light here unless the work could be carried out on such a large scale as to reduce the price very much below anything that is at present possible. No electric light scheme short of this would serve to sensibly relieve the pressure on the existing gas-works. Assuming the central district to be served by a principal generating station, Professor Kennedy suggests that any outlying or residential area requiring electric light can best be supplied from sub-stations with the dynamos driven by gas-engines. It will be gathered from this necessarily abbreviated statement that Professor Kennedy's

scheme differs in many important respects from anything of the kind hitherto attempted in the United Kingdom.

A good deal of comment has been aroused by the policy of the Birmingham Corporation in admitting an Electric Lighting Company into the city in preference to undertaking the work on their own account; and it is consequently interesting to watch the progress of this undertaking. The third annual meeting of the Company has just been held, under the presidency of Mr. H. Buckley, who gave a reassuring account of the state and prospects of the concern, which he described as progressing slowly, but steadily and satisfactorily. At the close of the past year, the Company had 8329 lights on circuit; and the number of consumers was 223—showing an increase of 90 during the year. It was claimed that the cost of production of electricity at the Company's works compares favourably with the working of any company in England; but the Chairman regretted that the margin of profit in contracts for fittings is very small. Competition has so cut down the prices in this class of electrical work, that in the majority of cases the Company are excluded from undertaking it. A dividend of 3½ per cent. was declared, carrying something to the credit of reserve and depreciation. Like most other electric lighting companies, the Company hanker after a larger area of supply, in order to provide more work for their station; but this desire has encountered the opposition of the Corporation.

The House-to-House Electric Light Supply Company come into the category of those Metropolitan electric lighting ventures that do not yet pay a dividend to the ordinary shareholders. There were 23,700 lamps (reduced to the 8-candle unit) on circuit at the end of the past year; and the business is reported to be still growing—as is the capital expenditure account. The revenue account shows a total income of £10,688, and a credit balance of £2836; but as only a "proportion" of management and other heavy expenses is charged to revenue, it is impossible to tell whether or not the so-called profit is a fair one. The undertaking is heavily loaded with £30,000 of debentures, and £19,685 in 7 per cent. preference capital; the interest and dividend on these amounts being £2762 a year, which has to be found somehow. One of the leading electrical journals—the *Electrician*—does not appear to think very highly of the Company's working, for after showing that, both in regard to capital outlay and revenue per lamp, this undertaking compares well with a dividend-paying neighbour, it points out that the House-to-House Company spend £5604 upon sheer cost of producing electricity for 23,700 lamps, while the Kensington and Knightsbridge Company produce current for their 47,441 lamps for £3746. There seems to be room here for a good deal of "averaging up." The Company's system has been criticized of late in connection with the death of one of their workmen from handling a street wire.

The Shoreditch Vestry, as we have had a former occasion to remark, have been considering the feasibility of supplying electric lighting in the parish, and have finally decided to adopt a scheme prepared by Mr. E. Manville, in which the generating station is to be worked in connection with refuse destructors and furnaces burning waste ashes. The plant is expected to cost £63,000, exclusive of site. It is stated that the Vestry now pay £3000 per annum for the disposal of the house refuse of the parish; and they hope by Mr. Manville's plan to save this outlay, and get the steam for the electric light engines for nothing. The idea is a very fascinating one, as it has been discussed before the British Association and other scientific bodies by gentlemen more or less interested in various patented kilns and waste-fuel furnaces. It has been proved, as conclusively as figures can prove any presumption, that every town in the kingdom possesses in its house refuse a supply of fuel good and abundant enough to light the streets and go a long way towards lighting the houses and shops. A London parish is, of course, a section of a town; and what is assumed to be true of a whole town ought to be true of a single parish. We shall await with much interest the development of this Shoreditch scheme; and if it does not turn out that under it the Vestry find it necessary to spend a shilling in order to save sixpence, we shall be among the first to congratulate them upon their enterprise.

THE YEAR-BOOK OF THE INSTITUTION OF GAS ENGINEERS.

The second volume of Transactions of the Incorporated Institution of Gas Engineers, the issue of which was briefly mentioned in last week's Journal, makes a stately show, with its 222 pages of letterpress, and numerous plates. The Institution must be congratulated upon this production, regarded as a whole. It is a well-compiled, well-arranged volume, of which any technical society might be proud; and it may be said of it with more than the conventional degree of truth, that it is a book which no student or practitioner of the art and industry with which it deals can afford to be without. There is an absence of all the formal padding that too often swells the bulk and increases the cost of issue of books of the same character, without adding to their general usefulness. For instance, there is no list of names and addresses of members, nor are the rules and constitution of the Institution reproduced. The money saved in this way has been more profitably laid out upon an Appendix, which enhances the value of the book, and upon extra plates illustrative of new gas-works plant and apparatus. It may be said of the volume that the Council have got it out, if not precisely without regard to expense, at any rate with a wise liberality. They seem to have determined to make it the "justifying document," as the French say, of the Institution; and for the same reason they have endeavoured to impart to it the character not only of an authoritative record of the proceedings at the meetings of the Institution, but also of a record of gas engineering and chemistry for the year. It is in this light that we shall review it here; for there is not much to be said about a mere reproduction of papers and discussions that were given to the world in our own columns many months ago; and the historical style of the official chronicler of the doings of the Institution at the May and October meetings is particularly curt and arid.

The Appendix, which is the novel part of the volume, occupies more than one-half of the total bulk, in consequence of the voluminous plates belonging to this portion of the contents. The first contribution to it is a communication by Mr. G. C. Trewby, Constructing Engineer of The Gaslight and Coke Company, descriptive of the four-lift gasholder at Beckton, which has a capacity of 8 million cubic feet, and is in a concrete tank 250 feet in diameter and 45 ft. 6 in. deep, based upon a bed of stiff clay. The tank is puddled. This important work is illustrated by reproductions of the contract drawings, eight in number. It is followed by a short description, by Mr. W. Foulis, of a three-lift gasholder recently erected at the Temple works of the Glasgow Corporation. This holder is in a brick puddled tank 240 feet in diameter and 45 feet deep; and the drawings fill five large plates. Next comes a communication from Mr. J. Ferguson Bell, describing purifying plant as laid down at Stafford, for 2 million cubic feet of gas per day, reducing the sulphur compounds to the limit prescribed for London by the Gas Referees. Seven plates are devoted to this plant. Then we have a paper by Mr. F. S. Cripps, on "The Determination of Strains in Solid Beams and Plates of Irregular Section, Acted upon by Forces in Various Directions, with Special Application to the Side Plates of Large Purifiers." This essay is accompanied by a plate of strain diagrams, and illustrated by small figures in the text explanatory of the author's method. It is highly instructive, and conveys some useful practical conclusions respecting the designing of purifiers. Mr. Foulis also supplies a description, with two plates, of his new hydraulic retort-stoking machinery, as used in the Glasgow Corporation works. Mr. J. Ferguson Bell gives a suggestive memorandum on the subject of the "Popularization of Gas, especially among Small Consumers," with references to a system he has introduced with much success in Stafford. Mr. Frank Livesey communicates a "Note" upon the analysis of daily gas consumption, which demonstrates the incidence of the "load" on the generating and distributing plant for the South Metropolitan Company's district; and Mr. E. Llewellyn Pryce has contributed some original observations on the estimation of ammonia in ammoniacal liquor.

It will be seen, from the foregoing statement, that the Institution has been the means of securing the publication of a considerable bulk of technical information of a highly valuable and practical order, which would not otherwise have been available for the use of the profession generally. This is emphatically a good work, which we hope will be continued and extended until the annual volume becomes the repository of a full record of all the noteworthy technical achievements of the members which, by reason of their matter-of-fact or non-controversial nature, do not call for *viva voce* communication to the general meetings. Fashions change in matters of gas-works construction as in other works of man; and it is most desirable that methods of embodying principles should be recorded and preserved at the time when they happen to be in vogue.

So far, as will have been seen, we have been able to award unstinted praise to the Council of the Institution for their new volume. At the end of the book, however, we find some pages of "Abstracts of Papers Published in Various Chemical Journals, &c.," and a page "Obituary," which strike us as a decidedly weak finish to an otherwise successful exercise in book-making. Gas manufacture has a physical and a chemical as well as an engineering side; and it is not a bad idea to acknowledge this truth in such a compendious publication as these Transactions aim to be. Everything depends, however, upon the way in which such an idea is carried out; and upon this head we cannot compliment the Council or their Editing Committee. The selection of matter to be reproduced in abstract is limited and arbitrary, and embraces nothing that cannot be obtained, in most instances to better advantage, from technical journals that may well be supposed to come regularly under the notice of the particular public to whom this volume appeals. If summarized translations of papers originally appearing in foreign journals not generally read by British gas engineers and chemists were given, the case would be altered. But there is nothing gained by abstracting (say) a paper by Professor Vivian B. Lewes, which has already appeared in full in the columns of the Journal and half-a-dozen other periodicals, where everybody who takes any interest in the subject-matter has marked it months before. We are disinclined to criticize the "Obituary" already mentioned, especially as we have painful experience of the difficulty of this order of literary compositions; but here again we must say that, if a task of this

kind is to be performed for a book of reference, it ought to be well done.

At the risk of offending the susceptibilities of some of the gentlemen responsible for the character of the publications of the Institution, we venture to offer a suggestion which, if adopted, would have the effect of vastly enhancing the value of these Transactions, and would at the same time supply a positive want. It is that, instead of wasting pains upon the preparation of superfluous hap-hazard abstracts of papers already available in English, the Council should take steps for the compilation and issue, as an appendix to their annual volume, of a comprehensive and reliable subject-matter index of all technical publications for the year, so that whosoever needs to ascertain what has appeared in print relating to any point of technics in which he happens to be interested, may discover where to look for it. This is an idea that is actually exercising, in one form or another, the minds of scientific workers of all descriptions. If the Council of the Institution ever happen to see the well-conducted journal called *Industries*, they must know that the question of indexing scientific and technical information has lately been discussed in its columns. Our contemporary has suggested the formation of a Scientific Index Society; supporting the demand by the argument that all existing learned societies have fallen short of their duty in this regard. How important this question really is hardly needs to be proved by argument. "It has been well said that accurate reference to forgotten work is almost equal to a new discovery. But the function of an index is not merely to rescue from oblivion facts which otherwise would be forgotten; it is equally potent to direct and stimulate research by assuring the worker against needless repetition, and preserving the continuity of scientific investigation." We do not suppose, however, that an indexing society of a general character, if formed, would be able to deal satisfactorily with the technical literature of coal gas. But what such a society could do for science generally, the Institution of Gas Engineers ought to be able to manage for its own particular subject. And it would be worth doing—first for one year, perhaps, and then for the past, as funds become available and workers can be organized.

Only, if the Institution undertake such a task as that above alluded to, there must be no narrowness of purview in planning it. The Institution does not contain within itself all the gas engineering knowledge of the country; and there really are a few publications, dealing with the same class of subjects as are to be found mentioned in its Transactions, that no educated gas engineer can afford to ignore. We hope we are in error in entertaining the suspicion, but it almost looks, from the signs given in the volume under notice and already commented upon, as if the Council are not free from the weakness of trying to pose the Institution as the "Universal Provider" of information for its members. By-and-by, if this is so, and the disease increases, they may be tempted to preface their Transactions with the motto ironically suggested by Porson for a certain college: "What isn't taught here isn't knowledge;" and this would be deplorable. The Institution is young, however; and youthful faults are seldom unamenable to correction.

In another article we shall hope to discuss this topic of technical indexing upon its merits. It is impossible to do a subject of such magnitude justice at the tail-end of a review of a volume of transactions which does not include it; and it is not fair treatment to the reader to make a book-notice a peg whereupon to hang an essay upon something altogether different from what is to be found in the book. Moreover, the question of the value of a subject-matter index to gas literature, brought up to date year by year, is not to be regarded as depending upon the appearance of such an index in the Transactions of the Institution of Gas Engineers. It is certain, however, that any annual publication connected with the industry which shall contain such a compilation, properly done, will be thereby entitled to the first rank as a year-book for gas engineers.

It now only remains to be said of this book of Transactions that the printers and publishers have done their work well, upon the whole. The reduction of the drawings to the scale necessary for inclusion in the plates has, unfortunately, been attended in some examples by a sacrifice of clearness, as generally happens when the draughtsman does not specially prepare his work for this treatment by thickening his lines and writing his dimensions in unusually bold figures. With a little trouble, however, and help from a magnifying glass, the details can be made out. The binding is not so strong as such a heavy book requires, if it is to stand much handling.

Burdett's "Official Intelligence" for 1893.—We have received from Mr. H. C. Burdett, the Secretary of the Share and Loan Department of the Stock Exchange, a print of the chapters on finance (including one on the London Water Companies) from his "Official Intelligence" for the current year.

The Boring for Coal at Dover.—The seam of coal which has been struck at Dover is reported to be 6 feet thick; and the net yield is estimated to be something like 80 million tons. It has not yet been stated of what class the coal is; but it is rumoured that some of it, at any rate, will be found very suitable for the manufacture of gas. If this turns out to be the fact, the discovery may have an important bearing on the future prosperity of gas undertakings in Kent and the adjoining counties, and even in the Metropolis.

NOTES.

The Waste of Coal in Scientific Traction and Lighting.

In the course of an instructive lecture on electric railways, recently delivered by Dr. Edward Hopkinson before the Royal Society, a striking illustration was given of the imperfection of all known ways of utilizing the energy of coal for the work of transit and in electric lighting. Dr. Hopkinson remarked that it is well for the engineer to be reminded from time to time of the difference between the amount of energy represented in the work done and that stored up in the coal with which he starts. The lecturer directed attention to the ultimate efficiency of electrical locomotive machinery, commencing with the coal and ending with the passenger carried through space. A wall diagram starting with the familiar 12,000,000 foot-pounds, the potential energy of 1 lb. of coal, showed the loss attending every step in utilization supposing it to be made with the most economical appliances known to the engineer—first in the boiler, then in the steam-engine, generator, conductors, locomotives, the dead-weight of the train, until finally arriving at the energy expended on the passenger himself, which amounts to 133,000 foot-pounds, or but little more than 1 per cent. of the original energy. It is even worse with incandescent electric lighting, in which the final efficiency is only about ½ per cent. of the energy of the coal consumed. Seeing, therefore, that, whether in lighting or traction, 99 parts of energy are wasted for 1 part saved, Dr. Hopkinson argues that the future has greater possibilities than anything accomplished in the past. It may also be remarked that these figures are a strong satire upon the claims of modern electrical engineering to be considered an economical way of using up the coal capital of the world.

Hints on Pyrometers.

Lecturing before the Society of Arts on alloys of metals, Professor W. Chandler Roberts-Austen has lately criticized the different kinds of pyrometers suitable for measuring high temperatures in connection with ordinary industrial furnaces. He spoke well of Mr. Callender's modification of the Siemens pyrometer, but remarked that there are objections to plunging a delicate instrument into a furnace; and he preferred M. le Chatelier's platinum and platinum-rhodium couple. He showed by means of the spot of light from the mirror of the galvanometer attached to this instrument, moving over a graduated scale some 40 feet long at the end of the room, the boiling-point of water, the melting-point of lead, the melting-point of silver, and so on up to the platinum-rhodium alloy forming one of the wires of the thermopile. Reference was also made to the optical pyrometer of M. le Chatelier, by means of which the temperature of a furnace can be ascertained by simple inspection; and it was argued that, with this and other reliable appliances now available for rationalizing furnace working, the systematic employment of ascertained heats in industrial operations ought to become more general.

Water Supply by Meter in Berlin.

According to information collected by Mr. James Pollard, the Chairman of the Edinburgh Public Health Committee, who has made a special study of the working of the municipal institutions and undertakings of Berlin, the meter system of water supply in vogue in the city, the introduction of which in substitution for the older system of supply by rate was described in the JOURNAL for July 26 last year (p. 170), has been productive of a remarkable economy of water. Almost all the people of Berlin live in "flats;" the tenements having an average of four floors, each containing two or three separate dwellings. The Siemens meter is situated on the ground floor, and registers the supply for the whole building—the proprietor paying for the total consumption; so that it is to his interest to see that the water-fittings are good. The water-works are only capable of giving a supply of 20 gallons per head of the population; but the actual consumption is only 15 gallons per head per day, although baths and water-closets are extensively used. The cost is equal to 4s. per head of the population per annum; and the profit to the Municipality is £108,000 per annum (or 34 per cent. of the total revenue), which goes to relieve the rates. In other towns in Germany, even where the tenement system does not obtain, a similar method of supply by meter is being largely introduced.

The Recalescence and Hardening of Steel.

Mr. William Metcalf, an American authority on the subject of steel, has made some instructive observations respecting the phenomenon of the recalescence of steel and its tempering. In the ordinary way, the recalescence of steel can be most easily seen in the behaviour of a thin wire, which if strongly heated and then allowed to cool will grow red hot of itself again after it has once dropped to nearly black heat. The temperature at which recalescence becomes apparent is 655° C. This seems to be also the best temperature for hardening—a process which appears to be dependent on temperature only because heat is the best means of bringing about the proper molecular condition of the metal. The proper temperature is easily determined by the eye alone, when properly trained in the judging of heats. Mr. Metcalf thinks it possible that the carbon in steel heated above the point of recalescence is practically in solution, unless the proportion is very large. At the recalescence point

and below it, the excess of carbon tends to cystallize out. Hence very rapid cooling of the steel is necessary to retain it in solution. It is one of the advantages of the use of gas in steel working that the appearance of the metal may be observed, and there is less risk of work being done upon it at temperatures shown by experience to be harmful.

A Portable Hydrocarbon Blowpipe.

An ingenious method of melting out the lead joints of cast-iron mains has been devised by Mr. Gardner, Superintendent of the Norwich (Conn.) Water-Works. He makes use of a Wells light for the purpose, by interposing a piece of flexible hose pipe between the burner and the body of the lamp, which enables the flame to be directed upon the work like the flame of a blowpipe. The lamp-flame is indeed converted into a veritable blowpipe when very high heating power is desired, by coupling with it an air-blast pipe connected to the air reservoir of the lamp. There is a little difficulty in working an ordinary lamp in this way, owing to the large consumption of air; but to overcome this Mr. Cundall suggests the addition of a second air-pump. The nozzle of the air-pipe is also apt to melt off, and needs to be protected by some refractory shield. The suggestion is published in the *Engineering Record;* and doubtless if a hydrocarbon blowpipe is really a convenient tool for certain main-laying operations, the manufacturers of various patterns of lamps of the class referred to will be able to supply such an apparatus at reasonable cost.

COMMUNICATED ARTICLE.

EXPERIMENTING WITH A VIEW TO THE DEVELOPMENT OF GASHOLDER CONSTRUCTION.

A REJOINDER.

By F. Southwell Cripps, Assoc.M.Inst.C.E.

Three letters have appeared in the JOURNAL, in reply to my articles on the above subject, from Mr. E. Lloyd Pease. It will be remembered that the articles related to some experiments published by Mr. Pease (*ante*, p. 14), which he made with a view to proving the strength of gasholders without guide-framing or vertical stays, and which experiments, I contended, instead of proving the advantages of that system of construction, proved exactly the reverse. [See Note D.]

In the first of Mr. Pease's letters (*ante*, p. 142), he contends that, in order to distort a gasholder by wind pressure similarly to the distortion which took place in the model experimented upon, it would be necessary to overcome the entire upward pressure of the gas on the crown of the holder, and that the wind pressure is insufficient to do this.

In reply, I need only remind Mr. Pease that the upward pressure of gas is already balanced by the weight of the sides and top; the one being exactly equal to the other. Hence, if another vertical force be brought to bear upon it, it will have its full effect; for if the upward pressure of the gas is to be entirely relieved in the manner Mr. Pease suggests, what will become of the hanging weight? Will it not be unsupported, and have to carry itself without the slightest assistance from the gas pressure? That is, one-half of the circumference would have to stand simply as a column of thin sheet iron.

If, again, only a *part* of the upward pressure is relieved, just so much weight of the sides, and no more, would be unsupported, and come upon the bottom curb. In fact, the sheeting just above the bottom curb being practically in a neutral condition, any balancing of the gas pressure means just so much dead weight on this portion of the sides. So we see that the full effect of the vertical compressive force induced by the wind pressure comes upon the sheeting just above the bottom curb, exactly as it would do if there were no gas pressure at all. The only difference is that, if there were no internal gas pressure lifting the holder, the whole of the weight of the side sheeting and top would act down on this same portion, *in addition* to the force derived from wind pressure, and so it would be doubly compressed.

But perhaps Mr. Pease's argument is that, in order to distort a cylindrical vessel, you must at the same time diminish its capacity; and therefore the internal gas pressure is increased owing to the reduced bulk. I gather this to be the meaning of his question, "What becomes of the imprisoned gas?" Of course, the reply might be simply to ask another question: "What becomes of it in the case of the model?" In the experiment there was distinct distortion of the vessel. Then what became of the gas? But supposing we try to analyze Mr. Pease's theory, and apply it to an actual gasholder. Assume that a gasholder is fixed at the base, and distorted to the same extent as the model, and that the holder is unable to "blow"—not being at its highest point. What would be the increase of gas pressure? In the model (3 feet high), the deflection from the perpendicular is recorded by Mr. Pease to have been about 1 inch for the 45 lbs. wind pressures, or $\frac{1}{3}$ inch to a foot in height. In Mr. Livesey's large holder, 180 feet high, the proportionate deflection from the perpendicular would therefore be 5 feet. [Of course, it would be altogether inadmissible to allow of any gasholder being 5 feet out of the upright, though Mr. Pease infers from the experiment that a gasholder would be perfectly safe under the same conditions as the brown-paper model.] The actual increase in gas pressure due to this distortion would be only 0·16 of an inch.* Hence we see that, instead of the compressive force due to wind having to overcome the entire upward gas pressure on the crown—viz., 80-10ths or 90-10ths—if we overcome the barest fraction of this pressure, it is sufficient to admit of the holder distorting to an alarming extent, from this point of view. [See Note E.]

Moreover, if this is all that can be advanced in support of gasholders without guide-framing, it is easy to show that a wind pressure of $2\frac{1}{2}$ lbs. per square foot would be more than sufficient to cause it to deflect out of the upright 5 feet.* We may well ask, What then would be the effect of a 45 lbs. wind pressure? The strength and resistance to strain of gasholders without guide-framing does not depend upon the above theory, but rather upon the diagonal resistance of the side sheeting and other equally unsatisfactory aids alluded to in my articles. (See *ante*, pp. 54, 94, 140, and 178.)

The main argument underlying the whole of Mr. Pease's first letter having been disposed of, it now only remains to consider his letter in the JOURNAL for the 7th ult.

In this letter, Mr. Pease lays much stress upon the apparent strength of side sheeting to stand upright during the erection of gasholders. His argument is that the vertical compressive strain set up by wind pressure in the side sheeting at the foot of a gasholder is always less than the compressive strain due to the weight of the side sheeting of the outer lift when it is erected in the tank; and therefore that, if it stands under the latter circumstances, it must under those first named, particularly as it derives additional assistance from inflation. This, if it were true in point of fact, would (disregarding other modifying influences and conditions) be a powerful argument; but, unfortunately, it is open to the gravest objections, and to direct disproof.

In the first place, it is somewhat begging the question to assume that the side sheeting of one lift only, standing alone without any stiffeners, is erect and perfect in form. Gasholder sides are frequently very flabby, and scarcely able to support themselves. Doubtless Mr. Pease is acquainted with holders which, even after they are completed and inflated with gas, present anything but a respectable appearance as regards shape and form in the matter of side sheeting, and which certainly do not need any extra inducements to get out of shape.

Moreover, it is unfair to base the theory upon *one* lift. A great deal more compression may come upon the bottom than that due to the weight of *one* lift, as we shall see when dealing with the example later on. No one would contend that the outer lift would carry the dead weight of three or four more lifts on the top of it—like a column—without buckling; and yet it would be far more reasonable to argue that it should be made capable of doing so before inflation, if it is ever to resist the compression induced by a 45 lbs. wind pressure after inflation.

The only proof Mr. Pease advances in support of his theory is the statement that, when the compressive strain due to wind pressure is calculated for even the largest gasholder in the world, the induced compression is much less than the compression it has already withstood during its erection in the tank. If the calculations were correct, there would be something in what he says; but, unfortunately, they may be proved to be wrong.

Mr. Pease supposes the largest South Metropolitan gasholder to be entirely divested of guide-framing, and to have some method of preserving the bottom curb horizontal. He then states that the compressive strain set up in a vertical direction by 45 lbs. wind pressure is "about 44 tons" on the bottom lift, whereas the side sheets were able to stand unsupported under their own load of 136 tons during erection. I am afraid that Mr. Pease has "put the cart before the horse." For, instead of 44 tons compression induced by wind pressure, it is fully 244 tons, and the load of side sheeting, when standing during erection, was only 40 tons on the same portion of circumference, instead of the 136 tons given by Mr. Pease. How the ability of a section of the side sheeting to stand alone in a flabby condition under its own weight of 40 tons proves that it is able to resist a direct load of 244 tons, I am at a loss to see.

By reference to Mr. Pease's letter in the JOURNAL for the 7th ult. (p. 231), it will be seen that he takes the total pressure of the wind on the five upper lifts as acting at a leverage only of the depth of the bottom lift (30 feet). He adds to the result the wind pressure on the lower lift acting at a leverage of 15 feet; and he then divides this moment of the wind pressure by the full diameter of the holder (300 feet), and states that this is the compression acting down on the sheeting, which is given as 44 tons. This Mr. Pease sets against the weight of the outer lift, which is stated to be 136 tons; and he concludes by saying: "If the sheeting immediately above the curb can resist this compressive strain (of 136 tons) when not inflated, cannot it be relied upon for 44 tons when supported by 12 inches of pressure inside?" †

All this is obviously wrong. If, in working the strains on any canti lever, we may conveniently collect the load distributed over it, and place it close up to the fixed end, we could bridge across from England to America with a single cantilever. All we should have to do would be to suppose the load (including its own weight) as concentrated at this end. But this is absurd. What Mr. Pease should have done was

*These calculations can be given, if desired; but they are so simple that I presume it is unnecessary.

† This pressure is over-stated. When the gasholder is fully inflated, it does not give *more* than 9 inches pressure.

to apply the total side pressure of wind at a leverage half the height of the holder corresponding to its centre of effort. We will do this, and see how the result compares with Mr. Pease's figures.

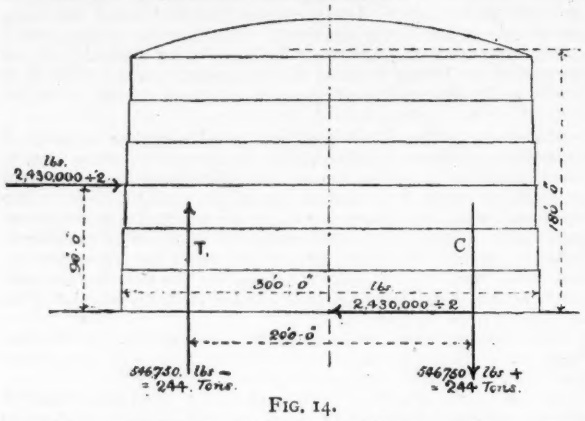

FIG. 14.

Let fig. 14 represent the gasholder extended as a cantilever. Now, the total pressure of wind at 45 lbs. per square foot * = 300 × 180 × 45 = 2,430,000 lbs. But, as it acts on a rounded surface, we may take half of this (strictly speaking, it should be 56 per cent.) = 1,215,000 lbs., which, acting at a leverage of 90 feet, gives a bending moment of 1,215,000 × 90 = 109,350,000 foot-pounds. This must be divided by the distance apart of the centres of resistance to thrust and lift, which, of course, are not at the *extreme* diameter (300 feet) of the holder, as Mr. Pease assumes. Roughly speaking, we may take T and C as 200 feet instead of 300 feet apart. Hence, 109,350,000 ÷ 200 = 546,750 lbs., or fully 244 tons compression on one side, and 244 tons tension on the other. That is, one-half of the circumference of the outer lift would suffer a compression of 244 tons, not 44 tons as given by Mr. Pease. Now to examine the other figures. The weight of the whole of the outer lift above the bottom curb, instead of being 136 tons as stated, is only about *one-half* that amount, or 68 tons; but supposing we say 80 tons. This 80 tons we may suppose was the weight resting on the entire circumference of the bottom curb during the erection. On half of the circumference, therefore, the pressure was only 40 tons. Hence the same half of the circumference which, from wind pressure, might be required to resist 244 tons, was proved during erection to be capable of resisting only 40 tons, or less than one-sixth of the pressure it might have been called upon to resist if it had been constructed on the lines Mr. Pease suggests. Surely 40 tons is not a sufficient proof test for a structure which might have to resist as much as 244 tons.

I do not think Mr. Pease is prepared to argue that, because a structure resists 40 tons, it will therefore resist 244 tons. But if he is not, his whole argument tumbles to pieces. A more reasonable conclusion to draw from the calculations would be one on a par with that deduced from the experiments—viz., that, *instead of proving the advantages of gasholders without guide-framing, they prove exactly the reverse.*

Having gone to the root of the matter, it is probably unnecessary to allude to minor points in the letters, such as Mr. Pease's reliance on the old theory of "Resist one gale, resist all;" the relative strengths of brown paper and iron or steel, &c. I would, however, remind Mr. Pease that, in the article accompanying his experiments in the JOURNAL, very much stronger statements and deductions were made from the experiments than the general and safe one to which his final letter desires to limit the discussion—viz., that "there is greater strength in the side sheeting of a holder than is generally credited."

That the internal pressure of the gas on the sheeting, tending to preserve the same in regular form, and thereby offering resistance to buckling, does materially assist the structure in withstanding wind pressure, I fully admit, and have long ago shown to be so; although, on the other hand, the advocates of no guide-framing started with the theory that no reliance could be placed in the sheeting, as it was only like the skin of an umbrella, and depended entirely on the framing. Mr. Pease's theory is now exactly the reverse of this. He rejects the framing as giving no more strength than the "rain-pipes to a house;" and he depends alone on the sheeting.

In concluding this series of articles, I would call special attention to the following:—

1. The greatest strain in gasholders without guide-framing due to wind is just above the bottom curb.
2. That the weakest point in all gasholders without guide-framing is just above the bottom curb.
3. Hence the greatest strain comes just in that place where the gasholder is the most vulnerable.

This is a *bad* principle in engineering—to have the greatest strain in the weakest place; and hence, as the principle underlying the whole structure is *bad*, I must, from an engineering point of view, condemn it.

NOTE D.

My final article closed somewhat abruptly on the subject of experimenting. The following may be added: In experimenting with model with a view to determining the laws governing the strains in gas holders, &c., it would be necessary, if they are to be of any real service to observe the varying influences of material, thickness, diameter height, gas pressure, weight, wind, horizontal stiffening-rings, vertical stiffeners, &c. A number of models of different sizes would be required, each of which should be subjected to the whole round of the above conditions, and the results recorded. It is not possible, from a few experiments embracing only some of the above conditions, to determine the relationship between models and actual structures. It would be a herculean labour to attempt it properly, and it is scarcely necessary, as the established scientific principles of mechanics can be applied with sufficient accuracy for all practical cases. As regards Mr. Pease's experiments with brown-paper gasholders, I think we may safely conclude that they show, not only how extremely difficult it is to devise experiments which exactly, or even approximately, fit the case, but how difficult it is to draw correct conclusions from experiments after they are made, however well they may have been conducted. Experiment, unless accompanied by the greatest caution, is perhaps the most misleading method extant for determining truth. Anything appealing to the simple senses carries conviction with it with the least amount of mental exertion, and has much weight with those who are unable, from various reasons, to investigate the matter. Hence the greatest care should be exercised in advancing experiments, and making deductions therefrom, which are erroneous.

NOTE E.

As a set-off against the aid rendered in this way, the following may be noted: If the gasholder leans (say) 5 feet out of the upright, the gas pressure acts *downwards* on the leaning side at its full pressure of 8 or 9 inches. This may equal the slight increase of upward pressure on the crown, due to diminished bulk. Also the centre of gravity of the holder is shifted to the right of the vertical line, passing through the centre of buoyancy, which introduces an upsetting couple, and so augments the compression on the leaning side.

* The full diameter (300 feet) is taken, because the centre of pressure of wind is, strictly speaking, at a greater height than 90 feet; the pressure of wind increasing as the elevation increases—*i.e.*, a 45 lbs. wind pressure may mean 50 lbs. at a point 200 feet high, and 40 lbs. at the ground.

TECHNICAL RECORD.

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

The Ninth General Meeting of this Association was held last Wednesday, in the Council Chamber, Cambridge. The visitors were favoured with a fine day; and, though several familiar faces at these meetings were missing, there was a fair gathering. During the first portion of the proceedings, Mr. W. BARRATT, of Grantham, occupied the chair, in the absence of the retiring President (Mr. C. E. Jones, of Chesterfield). Before commencing business, the members and friends partook of light refreshments, which had been kindly provided by Mr. W. Duesbury, the Manager of the Cambridge Gas Company, and the President for the present year.

AN OFFICIAL RECEPTION.

Mr. BARRATT, having taken the chair, introduced to the meeting the Town Clerk (Mr. J. E. L. Whitehead).

The TOWN CLERK said he had been instructed by their worthy Mayor (Mr. S. L. Young) to give the members of the Association a very hearty welcome to the town. The Mayor regretted that he was not able to be present; but the fact was he was not of robust health. When he took office, he made the stipulation that he should be relieved from all duties that were not absolutely necessary. Unfortunately, the meeting of the Association was called at a time when the Town Council were exceedingly busy with some heavy work. At the same time, the Mayor wished him to give the members a hearty welcome.

Mr. BARRATT said he was sure the members would reciprocate what had been said by the Town Clerk, and sympathize with the Mayor on his enforced absence from the meeting. They would have been very pleased to see him present, and to have accorded him a hearty greeting. He hoped the Town Clerk would convey to him the sympathy of the meeting, and their regret that he was compelled to be absent.

The HON. SECRETARY (Mr. H. Wimhurst, of Sleaford) then read the following letter from the Chairman of the Cambridge Gas Company:—

March 15, 1893.

Mr. President and Gentlemen,—It is with much regret and disappointment I am debarred by illness from the pleasure of being present at your meeting. But, though absent, I wish to express, as Chairman of the Cambridge Gas Company, in all accordance with my colleagues of the Board of Directors, first, a warm welcome to the Association of Eastern Counties gas managers to this your present central meeting at Cambridge; second, an assurance of the high appreciation felt for the great utility of such a combination as you have established for conference in advancement of interests connected with gas companies. It is well known to those who have taken the control of such interests, the essential importance of having managers well versed in all the details of the production of good gas. The manager has very much (I may say wholly) to be depended on throughout—from the selection of coal to the carbonization, the purification, and the various minute and accurate tests for purity before distribution to the consumers, and also for the supervision of labour and any other requirements. You, gentlemen, who have assembled here to-day hold such responsible and important positions; and you are thankfully to be congratulated on bringing to bear your united

knowledge and great experience on gas interests. You have our best wishes for a successful meeting, and, I hope, social enjoyment.—Very truly yours, DENNIS ADAMS.

Mr. W. DUESBURY (Cambridge) remarked that his Chairman had intended on the previous day to be at the meeting; and that morning he left his bed hoping he might get as far as the Council Chamber for a few minutes. But he was too ill; and he trusted the members would take the will for the deed.

On the motion of Mr. W. J. CARPENTER (Great Yarmouth), seconded by Mr. F. WELLER (Southtown, Yarmouth), a vote of thanks was passed to Mr. Adams for the kind words of welcome and appreciation of the work of the Association expressed in his letter.

LETTERS OF APOLOGY.

The SECRETARY announced that he had received letters of apology from several gentlemen who were unable to be present; among them being the Vice-Chairman of the Cambridge Gas Company (Mr. W. Townley Caldwell, M.A.), and Mr. W. A. Valon.

MINUTES OF LAST MEETING.

The minutes of the meeting held at Lowestoft in September last were confirmed.

NEW MEMBER.

On the proposition of the SECRETARY, seconded by Mr. A. J. YORSTON (Ely), Mr. John Dixon, of North Walsham, was elected a member.

ANNUAL REPORT.

Mr. J. BARTON (Peterborough) moved, and Mr. T. GREAVES (Melton Mowbray) seconded, and it was agreed, that the following report, with the statement of accounts, should be adopted :—

Your Committee have pleasure in presenting their fourth annual report to the members of the Association, and express satisfaction at the progress made during the year. Two half-yearly general meetings have been held—the spring meeting at Sleaford, and the autumn meeting at Lowestoft.

The number of members on the 1st of January, 1892, was 54. Ten new members were elected during the year, and two members have severed their connection with the Association under Rule 17—leaving the number of 62 as members on the 1st of January, 1893, which number the Committee hope will be added to during the current year.

The accounts show that the year began with £7 10s. in hand; and subscriptions amounting to £30 9s. have been received—making a total of £37 19s. The expenditure has been £24 0s. 4d.—leaving a balance in hand at the end of the year of £13 18s. 8d.; and five subscriptions outstanding.

At the spring meeting, the President (Mr. C. E. Jones) delivered his Inaugural Address, which was of very great interest to the profession; and Mr. J. H. Troughton read a paper on "Consumers' Fittings," which gave rise to an interesting discussion. The members and friends dined together at the Bristol Arms Hotel, Sleaford, at the termination of the business.

The autumn meeting of the Association was held in the Young Men's Christian Association Rooms, at Lowestoft, under the presidency of Mr. C. E. Jones, when Mr. W. J. Carpenter read a very valuable paper upon "Carbonizing Methods, Past and Present," which elicited a good discussion.

Prior to the meeting, the members and friends met at the Suffolk Hotel, Lowestoft, and were most hospitably entertained to luncheon by the Water and Gas Company of Lowestoft; the Chairman (Frederick Morse, Esq.) presiding, supported by the Mayor of Lowestoft (B. M. Bradbeer, Esq.), J. Ayris, Esq. (the Engineer), and other gentlemen. After the meeting, the whole number were conveyed in coaches to visit the Company's water-works at Lound, at the invitation of the Directors, much to the enjoyment of all present.

The members and friends dined together in the evening at the Suffolk Hotel, under the presidency of Mr. C. E. Jones, supported by the Mayor, F. Morse, Esq., Colonel Seppings, H. Leman, Esq., J. Ayris, Esq., and other gentlemen—the usual loyal and other toasts being honoured.

The officers for the year 1893 were elected at this meeting, as follows: President, Mr. W. Duesbury; Vice-President, Mr. W. J. Carpenter; Hon. Secretary and Treasurer, Mr. H. Wimhurst; Auditors, Messrs. F. Weller and A. J. Yorston; Committee, Messrs. T. H. Martin, A. Drage, and W. J. Wells.

The thanks of the Committee are due to those members who have contributed papers during the year; and the Committee express their desire that each member will undertake a similar task in future, and that each will use his influence on behalf of the Association by inducing gentlemen to join in the work of the Association by becoming members.

THE NEW PRESIDENT.

Mr. BARRATT said his next duty was to introduce to the members the President for the ensuing year, Mr. Duesbury. (Applause.) He was sure from the manner in which they had received his name that he did not require any commendation from him. He added that he was very sorry Mr. Jones, the retiring President, was unable to be with them.

The PRESIDENT, on taking the chair, thanked the members for the kind way in which they had received him. He was, however, afraid they would be somewhat disappointed before his year of office ended; but he promised he would do his best in carrying out the duties pertaining to his position. Before proceeding with other business, he wished to propose a vote of thanks to their late President. He thought he might say that, in electing Mr. Jones to preside over them, they had selected a capable and painstaking man. He had conducted the business of the Association in a fair and honourable manner; and the thanks of the members were therefore due to him.

Mr. J. G. HAWKINS (Spalding) seconded the motion, which was unanimously agreed to.

The PRESIDENT, before reading the following address, remarked that he was sorry three of the members of his Board of Directors were ill, or they would have been present to greet the members. Unfortunately, since their last meeting, two of the gentlemen who welcomed them when they visited Cambridge in 1891—the then Mayor (Mr. F. C. Wace, M.A.) and the Chairman of the Gas Company (Mr. Alderman C. Balls, J.P.)—had gone over to the majority.

INAUGURAL ADDRESS.

Gentlemen,—In addressing you to-day, I shall not attempt to deal with the higher and scientific branches of our profession; but ask you to excuse my shortcomings while I attempt to bring before you a few subjects of general importance and, I hope, of interest. During the past year, we, as members of the gas industry have had conditions to contend with that have had a prejudicial effect upon our finances. These are chiefly the low price of residuals; my Company alone having received in the last half year £800 less for tar and ammoniacal liquor than they did in the corresponding half of 1891. I am pleased, however, to say that these residuals are now realizing a higher price than last half year. The price of coal has shown a somewhat downward tendency, although the new railway rates, if persisted in, will bring the price up again. But this at present appears doubtful, as the public are strongly demanding a return to the former rates. We, as an Association, have great cause for congratulation on our continued prosperity; and I think we shall all agree that this is chiefly in consequence of the exertions of our capable and energetic Hon. Secretary and Treasurer (Mr. Wimhurst), to whom our united thanks are due.

I have now been connected with the gas industry over fifty years; and it will perhaps be of interest to draw a few comparisons between the mode of manufacture then and at the present time. Small iron retorts, with a make of about 2000 cubic feet per mouthpiece, and 7000 cubic feet per ton, have been superseded by the modern large clay retorts, making 7000 or 8000 cubic feet per mouthpiece, and over 10,000 cubic feet per ton. Dips of 4 inches and upwards are supplanted by the present small dip or anti-dip arrangement. Exhausters were very rare; and there was then no efficient scrubbing plant. The purifiers were generally charged with lime in a liquid state, which, when fouled, formed a most disagreeable refuse known as "Blue Billy," a very different state of things to the purifying at the present day. The station meters have also undergone considerable improvement; but perhaps in no department is the difference more marked than in gasholder construction, as witness the very small counterbalanced holders at that time in use and the large gasholders of the present day—all types of the progress of engineering skill, particularly so the colossal structure just completed at East Greenwich to the designs and under the direction of Mr. Frank Livesey. Indeed, it may be said that gasholder construction has undergone a complete reformation at the hands of engineers, as, besides the many splendid types of external guide-framing, we have the holders constructed on Mr. Gadd's system of internal spiral guides and Mr. Pease's wire-rope system, both of which dispense with, and save the cost of the usual guide-framing. Many consumers were then supplied with gas without a meter (there being a prejudice against them); the charges being based on the number and size of burners, and the number of hours in use, according to agreement. The price of gas at that time was about 10s. per 1000 cubic feet (subject to a small discount for prompt payment), and with an illuminating power of 10 to 12 candles. Burners have also been very considerably improved, as compare the old single jet or rat-tail and iron slits with the many splendid patterns now in use. Many of the streets in the large towns derived their light from oil-lamps, and what few gas-lamps were used were small, inefficient, and very far apart, giving light to only a very small portion of the area requiring light—a great contrast to the best systems of lighting at the present time, as carried out by the aid of the lamps of Messrs. Sugg, Bray, and other manufacturers. All this goes to prove the great strides that have been made in all branches of our industry; and this progress is still going on.

The buying and storing of coal is one of the first and most important items we have to deal with. I think it is advisable to buy coal of the best quality (at a fair price), especially where gas of a high illuminating power has to be supplied, as, except the value of the coal in the pit unworked, all charges for labour, plant, and carriage are the same per ton for inferior as for better coal. The last item—the carriage—forms a very considerable part of the total cost of the coal used in this district; it being at Cambridge 42 per cent., and, if cheaper coal was used, it would, of course, be more. This argument also holds good in regard to the expenses of storing and carbonizing. Better coke is also made from the better coals, the good quality of which, I find, greatly increases the local sale. The cost per 1000 cubic feet of gas made from the best class of coal will work out very favourably with that obtained from coal of an inferior quality. Buy, as far as possible, coal with which you are well acquainted, or have strongly recommended to you, and let your specification be fair, but very firm. It is also advisable to buy from different coal-fields if possible, so as not to have your supply altogether cut off in the event of district strikes.

I think it would also be to our advantage if gas managers generally would buy and receive coal in more regular consignments. In storing, the better coal, again, has an advantage;

as, being free, or nearly so, from pyrites, there is really very little risk of firing. In proof of this, notwithstanding that we keep very large stocks of coal, I have never seen or heard of any signs of heating whatever, and this where no means of ventilation are taken. Of course, in most cases the small depth of the coal would prevent firing. As the labour in the coal-fields is still in a very unsettled condition, and likely to be so, consequent on the demands of masters and men, it has become a necessity to lay in large stocks, so as to have on the works (in case the supply is entirely stopped) sufficient coal to carry us over the next six or seven weeks. This large stock is also, in my humble opinion, much better under cover, and will well repay the outlay of capital on the necessary sheds for this purpose. The coal-sheds should be in close proximity to the retort-houses, and should be well built, lofty, the floors solid and dry, and slightly higher than the surrounding ground. By having our coal under cover, we are thus enabled to carbonize dry coal at any time when necessary through low heats, which have been produced by using fresh wet coal. A large percentage of the sulphur compounds is left in the coke when dry coal is carbonized, which, if the coal was wet, would be carried to the purifying plant. The deterioration of coal, consequent on exposure, is also considerably reduced. Now that such large stocks of coal are necessary and general, it entails a large amount of labour in storing and removing the same, so that conveyors or aërial ropeways will doubtless come largely into use, except in very small works, as they will tend to decrease the cost of manufacture—in fact, mechanical appliances are coming into general use throughout the whole of the works, with very beneficial results, particularly in the retort-house.

As to fire-clay goods, I certainly think that the best quality should be used, as the same arguments hold good here as with coal; very often good labour being almost thrown away on bad material. I also recommend, where possible, that a good stock should be on hand, the same to be under cover.

I should be pleased to see a Committee formed for the purpose of fully considering the sizes and patterns of retorts, with a view to making standard sizes and patterns, and so reduce the hundreds now in use. This step is certainly necessary; and, if a proper and workable basis could be decided upon, I feel assured that it would be of great benefit to the gas industry at large. This would, of course, apply chiefly to clay retorts, and partly to brick retorts; the latter being preferred by some engineers.

There are very many good systems of retort-settings; but without doubt the recuperative system is by far the best, both for economy of fuel and results of carbonization. Either the recuperative system proper, or a modification of the same, may be used with great advantage on even the smallest works. I do not know of a single failure where this system has been tried, provided that the settings have been built with care, and on a good plan, and that materials of the requisite good quality have been used. The first outlay of a recuperative setting is certainly heavier. But the expenditure for repairs is very much less than for an ordinary setting; and the coal carbonized per mouthpiece for the total time in use is more than doubled, notwithstanding that only the same amount of coke for fuel would be required in each case. Both the make per ton and the illuminating power are also increased by the regular heat that is obtained. The ascension-pipes should be of large size, and a good distance from the face of the setting, which, I think, is a great preventative of stopped pipes. The hydraulic main should have a shallow liquor but large gas space, and carried independently of the stack; also fitted with apparatus for the immediate removal of the tar and regulation of the seal, which should be small, so that the exhausters can be worked at level gauge or very little suction. The main should be provided with screens lying on the top of the liquor, to keep the same from oscillating, and consequently the dip normal. The foul main should be of large size, both in diameter and length; so that the gas may be gradually cooled before coming to the condensers. Sudden fall in temperature causes great deposition of valuable hydrocarbons; and consequent deterioration in illuminating power.

At my works the gas passes through the exhausters before coming to the condensers—an arrangement that seems to answer remarkably well; the tar acting as a lubricant. The condensers should be capable of being regulated, so as to keep the gas at a normal temperature under varying conditions of the gas and atmosphere. Condensers of the annular type, or one of the several patterns of water condensers, are best adapted for this purpose. I give my preference to the latter, both on account of space and efficiency. The warm gas, on entering an annular condenser, is subject to the action of a cooling agent of the same low temperature as exercises its influence on the cooled gas as it leaves the apparatus; while in a water condenser the temperature of the cooling agent is lowest where the gas is in a cooled condition—*i.e.*, at the gas-outlet, and highest at the gas-inlet. The gas and the water pass through the condenser, entirely independently of each other, and in opposite directions; the water absorbing the heat of the gas, its temperature being raised, while the temperature of the gas is, of course, reduced. But the chief point is that we have the gas cooled by an agent with a lower temperature, the degree of which varies in direct proportion with the temperature of the gas; the water as it leaves the condenser near the gas-inlet having a temperature approaching that of the gas itself. Thus we have very gradual and almost perfect condensation.

Any of the best types of washers are efficient—being capable of removing the whole of the tar from the foul gas, also other impurities; but some have the disadvantage of causing much back pressure. Of the various types of scrubbers, I think the tower scrubbers, filled with boards on edge, are the most efficient, especially if worked in pairs; liquor being used in the first and clean water in the second. The weak liquor, on leaving the second (having removed the last traces of ammonia and a little carbonic acid and sulphuretted hydrogen), can, with advantage, be run into a cistern, which also receives the liquor from the hydraulic main and the condensers. This liquor can then be pumped to the top of the first scrubber; and, as it contains a large percentage of free and combined ammonia, it will remove a large quantity of the sulphur compounds and carbonic acid.

The purifiers should be of large area—say, one superficial yard of grids to every 1000 cubic feet of gas produced per 24 hours with the maximum make; with an adequate space for the gas between each layer. A set of six purifiers, I think, is best, so as to have working at one time (except when emptying) four lime boxes (the first two for the elimination of carbonic acid, and the second two for the sulphide of carbon) and two oxide boxes for sulphuretted hydrogen. Much material, labour, and nuisance are saved by the admission into the gas, before purification, of a small percentage of oxygen, either pure or diluted, as in atmospheric air. Either can be employed with great advantage; but the air has to be used with care, as, if a too large percentage is admitted into the gas, it results in a serious reduction in the illuminating power. Oxygen is no doubt the best; and I note that our friend Mr. Barton has drawn in oxygen, so as to keep up constant revivification, and that he has known instances where the purifiers have been charged with fresh oxide and not discharged until the material contained nearly 60 per cent. of sulphur. This is, no doubt, an exceptional case; but it shows what can be done under favourable conditions. Not only is there a saving of material and labour by the use of oxygen, but it is also stated by some engineers to improve the illuminating power to such an extent as to obviate the use of cannel. Spent lime in some districts realizes a good price; but at some works it cannot be even given away. We at Cambridge are unfortunately to be numbered amongst the last-named; and I shall be pleased if one of our members, at some future time, will give us a paper on the "Recovery or Disposal of Spent Lime."

A station meter is essential on even the smallest works, both to ascertain the quantity of gas made, and also from that datum to find out the quantity of gas unaccounted for or lost by leakage. Holders should have a capacity at least equal to the maximum consumption for 24 hours; and a reasonable outlay of capital on the holders to obtain this, is amply repaid by the wear and tear saved on the carbonizing plant.

Distribution is a very important part of every gas undertaking; and upon the manner this work is executed depends, to a great extent, the percentage of gas that is (as we term it) unaccounted for. Hence the importance that this work should be carried out in the best manner possible, both as to materials and labour. The trunk mains should be of sufficiently large diameter; and I believe it would be better if the branch mains were not reduced in size to so great an extent as they now generally are. I never lay any mains of less than 3 inches in diameter. The extra cost of the increased size of the mains is only a small proportion of the total cost; whereas the reduction in the leakage account, through less pressure being required, is considerable. I may here state that our unaccounted-for gas last year was reduced to a little over 3 per cent. of the total make. The mains should be laid at a depth of not less than 2 feet, so as to avoid breakage; and the gas is thus less liable to the action of frost. This also enables us to lay the services deeper, and with a good fall to the mains.

I find it much the best not to lay less than ¾-inch services up to the meters, which may be either wet or dry—some gas managers preferring one kind and some the other. Dry meters are certainly less trouble and expense, and are not liable to stoppage on account of frost. Laying service-pipes in V-shaped channels, and covered with hot pitch, greatly prolongs their durability, and will repay the extra trouble and cost. I know some managers who lay galvanized wrought-iron pipes, and others wrought-iron pipes for steam; and they state that in the end they are cheaper than ordinary gas-tubing. In some districts lead pipes are found to be the best and cheapest for services.

The subject of internal fittings was efficiently dealt with in a paper read at our last annual meeting by our friend, Mr. Troughton, in which he gave the sizes and lengths of pipes to be used for the number of burners required. This subject deserves great attention, as gas companies frequently get blamed for a deficient and poor supply of gas, or unsteady lights, when they are really giving a good supply of gas of a high illuminating power; the fault being really due to imperfect fittings or to burners of a very wasteful, inferior kind, or to burners of a good class that have become worn out. There is very little doubt that, if governor burners were more generally used, we should have very many less complaints. Some engineers, notably our friend Mr. Valon, strongly recommend that houses be fitted up by the owners of gas-works (whether companies or

corporations), and the cost incurred be recovered by charging in these cases an extra price for the gas consumed. I have given this subject great consideration; but at present I cannot see my way to recommend such a course to my Directors for their adoption. I am, however, certainly of opinion that gas-fitting of all descriptions should be carried out with as little expense as possible to the consumer, particularly so in the case of stoves and fires, so as to encourage the use of gas in every way. As a further inducement, my Company are at present allowing a discount on stoves and fires of 25 per cent. for cash. They also encourage consumers to buy rather than hire.

The next question that I wish to bring to your notice is that of public lighting. In some towns the corporation have the sole control of, and supply to, the lamps. In others they have the control, supply, and maintenance of the lamps and fittings, the companies merely supplying the gas; or, as is the case at Cambridge, the Corporation decide upon the position of the lamps and the quantity of gas to be used, the Company providing the gas, columns or brackets, lamps, and fittings complete; also the lighting, extinguishing, cleaning, and the general maintenance, charging a fixed sum per lamp per annum. But I certainly am of opinion it is much better for the gas company to supply gas only—the corporations finding all fixtures and the lighting, &c., of the lamps. I think that it is also better to charge on the average-meter system, having governors fixed to all lamps and a meter (say) to every sixth lamp, as a fairly correct result is thus obtained. In large and busy thoroughfares, the high-power lamps as supplied by Messrs. Sugg, Bray, and others may be used with advantage to all.

Since our last meeting at Cambridge an Electric Supply Company has built works, laid down plant, and commenced supply. I am, however, pleased to say that a good feeling exists between us. The great cost of the production of electric light will, however, at present prevent it coming into general use. No doubt, one reason for its popularity is its novelty; and it still must be regarded as a luxury. There is, however, ample room for both gas and electricity; and notwithstanding a decreased consumption during the hours that shops are lit up, we hope, by further increasing the use of gas for domestic purposes and power, to maintain our usual increase. I may here state that the Gas Company sold over £10,000 worth of shares last month; and they realized a higher price than they did in 1890—thus positively showing, I think, that the public are still believers in the use of gas, and in the continued prosperity of gas companies. Oil is also a great competitor, on account of its cheapness, and the small outlay required for lamps; but it has many disadvantages—notably its danger and trouble.

I am pleased to congratulate you on the present settled state of our workmen. This, I think, is chiefly due to the firm yet fair manner in which their demands have in most cases been met. I think it behoves us all, as managers, to treat the men under us in a fair and considerate manner, and to endeavour, as far as possible, to elevate their moral tone, as, by so doing, we shall not only benefit the men, but also our employers. I think it advisable that the proprietors of gas-works, whether companies or corporations, should create a general provident fund, and assist their employees to maintain the same; so that it can be used or called upon in case of sickness, old age, or death. The step thus taken should make the workmen take more interest in their work, because of the provision made for them. It would also have a tendency to elevate their character, and make them thinking men, and not mere machines, as too many now unfortunately are; and I feel sure that, in a little time, there would be less cause to complain of the great prevalence of excessive drinking among our stokers and other men.

There is one more subject that I wish to touch upon, and that is, that I believe in the near future it will be advantageous to reduce the illuminating power of gas, and, consequently, to a large proportion, the cost of production, so as to be able to supply it at a lower price, and also prevent the great waste that is now taking place by using gas of high illuminating power (in my case, 18 candles) for heating, cooking, and motive power. The same amount of light as now could be generated by using more, larger, or better burners—among the latter being the incandescent Welsbach.

It now only remains for me to sincerely thank you for the honour you have done me in electing me your President for the ensuing year. I feel the responsibility to be very great, and only accepted the position after much hesitation. However, I trust that I may successfully discharge the duties in connection with the office; and it shall certainly be my endeavour, whenever possible, to further the interests of this Association in particular, and of the gas industry in general.

At the close of the address,

Mr. J. Carter (Lincoln) said it was with genuine satisfaction that the privilege fell to him of submitting a resolution, expressing the members' sense of acknowledgment to the President for his interesting address. He had touched upon many points which would induce consideration on their part, and probably if they directed attention to those particular points, it would be of general advantage.

Mr. A. Mitchell (Bury St. Edmunds) seconded the motion; remarking that he hoped some member would devote his energies to finding out a way of disposing of their waste lime; and, if he was successful, his fellow-members would be very glad to learn how to make it useful.

The President briefly acknowledged the vote.

[A paper entitled "The Protection of Gas Engineers," by Mr. J. A. Fielding, of Waterbeach, was then read; but it proved to be of a character altogether unsuited for presentation to such a meeting. Opinions to this effect were freely expressed after the business had concluded; and as a result a request has been sent to us to withhold publication of the paper and the somewhat desultory discussion to which it gave rise.]

Proposed Alteration of the Date of the Spring Meeting.

Some conversation took place upon a suggestion which had been made to alter the date of the spring meeting to the third Wednesday in April instead of March; and, in order to test the feeling of the members on the subject, a vote was taken, which showed that the proposal was unanimously approved by those present. A resolution was passed requesting the Committee to take the matter into consideration before the autumn meeting.

Place of Next Meeting.

Mr. Greaves having intimated that it would give him and his Directors much pleasure to see the members at Melton Mowbray in September next, it was unanimously resolved that the autumn meeting should be held there.

The proceedings concluded with a hearty vote of thanks to the President for his conduct in the chair, and to the Hon. Secretary for his services during the past half year.

The members, with a number of friends, dined together in the evening at Ye Olde Castel Hotel. On the following morning, a few of them accepted an invitation of the Directors of the Cambridge Water-Works Company to visit their works.

REGISTER OF PATENTS.

APPLICATIONS FOR LETTERS PATENT.

4249.—Orme, F. H., and Collins, J. W., "Pressure-gauge." Feb. 27.
4270.—Collinge, J., "Chimneys, globes, &c., for use when oil or gas is the light-giving medium." Feb. 27.
4327.—Heys, W. E., "Admission-valve for gas or oil engines." A communication from R. Langensiepen. Feb. 28.
4365.—Royle, J. J., "Gas-fittings." Feb. 28.
4369.—Siemens, F., "Combined flame and incandescent lamp." Feb. 28.
4425.—Gill, T., "Automatically turning the light of gas and electric lamps up and down." March 1.
4503.—Triebel, W., and Heinrichs, E., "Gas-engines and the pistons thereof." March 1.
4564.—Bellamy, A. R., "Gas and similar motor engines." March 2.
4628.—Clerk, D., and Lanchester, F. W., "Gas, petroleum, and like engines." March 3.
4634.—Crossley, F. W., "Gas-engines." March 3.
4656.—Archer, T. D., "Preventing the freezing of water in the cups or lutes of gasholders." March 3.
4671.—Sugg, D. W., "Inverted gas-lamps and burners for the same." March 3.
4696.—Davy, D., "Gas and other internal combustion engines." March 3.
4758.—Latham, W. C., "Ovens of gas cooking-stoves." March 4.
4840.—Boult, A. J., "Petroleum or similar engines." A communication from A. A. Barends. March 6.
4873.—Okes, J. C. R., and Goold, W. T., "Forcing air or other gases." March 7.
5005.—Rollason, E., "Preventing the bursting of gas-engine and other water-jacketed cylinders or pipes by the freezing of the water." March 8.
5006.—Rollason, E., and Barker, T. B., "Gas-engine governors." March 8.
5011.—Trewhella, J., "Gas and petroleum engines." March 8.
5054.—Richmond, E. W. T., and Simmance, J. F., "Gas-fires." March 8.
5093.—Bamford, F., and Howarth, W., "Increasing the power or efficiency of gas motor engines." March 9.
5138.—Falk, S., "Lamps." March 9.
5199.—Hargreaves, J., "Gas-producers." March 10.
5237.—Redfern, G. F., "Gas-regulators." A communication from J. Duncan. March 10.
5256.—Lake, H. H., "Gas-pumps." A communication from T. Backeljau. March 10.
5312.—Smith, W. B., "Gas-burners." March 11.

Ottoman Gas Company, Limited.—At the half-yearly general meeting of this Company to be held to-day, the Directors will report a net profit of £3477 on the working in the six months ending Dec. 31 last. The amount standing to the credit of the profit and loss account is £4078, which the Directors recommend should be dealt with as follows: To the reserve fund, £1000; dividend at the rate of 7 per cent. per annum, £2625; balance to be carried forward, £453.

Nottingham and Derby Water Gas Company.—The Liquidators of this Company, in a circular-letter addressed to the shareholders, state: "There still remains in hand a balance of £7334 15s. 1d., *plus* such interest as may accrue to the date when £6500 is withdrawn from investment; while there remain still to be paid sundry creditors and law costs—leaving a balance of £3402 2s. 9d., *plus* the aforesaid interest, available for meeting the Liquidators' remuneration, and making a final distribution to the shareholders."

CORRESPONDENCE.

[*We are not responsible for opinions expressed by correspondents.*]

Air v. Oxygen for Gas Purification.

SIR,—Having had the advantage of many months of experimental and practical work in connection with the use of air and pure oxygen in gas purification, my letter in the JOURNAL for the 7th inst., raising certain points, was sent with a desire to call forth discussion on this interesting subject, and, if possible, get some clear idea of the general opinion as to the effect of air on illuminating power, and also as to whether pure oxygen was not more economical, in actual practice, than air. Mr. Carpenter's letter in the last number of the JOURNAL seems to imply that he does not feel inclined to help me in this object.

I must take exception to Mr. Carpenter's statement that I asserted that 14-candle gas could be raised to 16 candles by the use of ½ per cent. of oxygen. It is needless to say that nothing of the kind was conveyed in my letter, which was simply intended to open up a discussion, and to point out some things which I thought could be made much clearer.

W. G. HICKS.

Ascot Gas-Works, March 17, 1893.

SIR,—Observing in the JOURNAL of late that there has been, to my mind, a rather over-anxiety on the part of certain gentlemen to overstate the case for air as against oxygen in gas purification, particularly as regards illuminating power, I think it is only fair to call your attention to the following extract from a report to the Bowman Oxygen Lighting Company, made by one of the gentlemen referred to, on Dec. 5, 1890:—

> Of the commercial value of oxygen there can be no doubt, if it can be produced at a low price. One among its many uses may be given—namely, in the purification of coal gas. Oxygen, in some form or other, is probably indispensable to complete, and it certainly is to economic, purification. It is obtained now by admitting to the purifiers very small quantities of air. Great care has to be exercised, since the unabsorbed nitrogen which passes forward, acting, *at least*, as a diluent, reduces the illuminating power; and to use the proper amount of oxygen in the form of air would, in many cases, necessitate the employment of more expensive coals to maintain the lighting standard. *If pure oxygen be used instead, the theoretical quantity required can be admitted without adversely affecting the light-giving power of the gas;* while the purifiers can be allowed to run a much longer time without the removal of their contents—effecting a large saving in labour, as well as a reduction in the nuisance almost inseparable from their changing.
>
> (Signed) CHARLES C. CARPENTER, Assoc.M.Inst.C.E., &c.

You will notice that this report is a very recent one, dated Dec. 5, 1890; and it forms such a contrast to the communications made by the same gentleman to the Southern District Association that one almost wonders whether some other gentleman has been masquerading under Mr. Carpenter's name. Perhaps he will kindly set this doubt at rest.

G. KEYTE.

Westminster, March 16, 1893.

The Supply of Gas in Flats.

SIR,—Your editorial remarks on the case of *Hersey v. White and others*, in the current number of the JOURNAL, put the matter very concisely; and they should be of interest to the London Gas Companies. Allow me to point out, however, that your report of the case is incorrect in a most important point, inasmuch as it destroys my original plea against paying the imposition of any profit to the landlords. The fact is I had one, and only one, agreement—viz., for a lease of the flat; and in this agreement the only clause respecting gas was as follows: "Except the gas-rate, which is to be charged according to the amount consumed." I maintained that this clause in the first case did not bind me to pay the landlord at all, or if it did, then it certainly did not state that I was to pay a profit on the rate; and, further, there was no mention of a meter whatever. This therefore came to me as an appurtenance or easement with the flat. Your report states that I had an agreement independent of the lease by which I contracted to pay a specified rental for the meter, and a percentage equal to 3d. per 1000 cubic feet on the gas consumed—implying that I knowingly broke a definite agreement. Had I agreed to any such condition, I should, of course, have kept to it; and therefore the gas would never have been cut off. As a matter of fact, I had not the slightest idea, when taking the flat, but that I should be charged by the Gas Company for any gas used. But, on the first account being rendered, I understood the position; and, although objecting to the extra charge, I at once expressed my willingness to pay the landlords at the proper rate. In fact, I sent them a cheque accordingly, which they declined to accept.

G. W. HERSEY.

70, *Berners Street, W., March* 14, 1893.

The Investment of Reserve Funds.

SIR,—Your correspondent who signs himself "Gas Accountant of Thirty Years' Standing" has set out unorthodox views for so much experience; and he might have avoided inferring an enigma that was not embodied in my letter. Whoever would write about re-valuing a nominal account—*i.e.*, a reserve fund—for a balance-sheet? Most decidedly it would not be anyone with book-keeping experience; therefore it does not come *in practice*. But as regards valuing Consols or other Government securities, the work is so simple that I do not know how the word *impossible* creeps in; for, if a sum of £5000 be invested *specially* on account of a reserve fund, it is always necessary that the investment be valued for each balance-sheet; and that the then ascertained value should be shown thereon.

A reserve fund Cr. for £5000 is, in practice, a "nominal account" which usually gets its origin by a *transfer* of £5000 from the profit and loss account Dr.; and afterwards, when £5000 cash has been drawn for an investment in Consols or other security, cash is Cr., and a specially-opened account—styled, say, "Investment (Reserve) Account"—must be Dr. It stands to reason, and is proved *in practice*, that it is not an impossibility to re-value stock investments as often as directors may require; the operation is so easy to do, and *it should be done*, for each and every balance-sheet. And yet, whatever may be the estimated value of such stock investment, still the reserve fund might remain stationary at £5000. My theory is admittedly correct, and *in practice* the theory is well known to be a true one by all practical accountants.

A reserve fund in a company or trading concern does *not* stand in the same position as trust money invested by trustees, and I need not argue the point *re* trustees. But when there is a liability of £5000 for a reserve fund in a balance-sheet, there should be *per contra* real or "liquid" assets, which are either convertible or realizable in the due course of business; for assuredly a liability should not have *per contra* fallacious dummy-figure representations. Consequently, though £5000 cash has been paid for an investment in Consols, only the current market value of Consols should be noted on the balance-sheet; of course, only to the extent of £5000 to rank in the assets.

Should the estimated value show a lessened value of £100, the balance-sheet ought to represent the stock investment as an asset worth £4900. Neither an accountant nor an auditor should make more sterling value appear to exist; and yet the reserve fund can remain stationary *as a liability* at £5000. *No outlay is required*, because the loss in value can be righted by a credit transfer from the profit and loss account. While appointed auditors sanction an investment of Consols or other securities to appear as assets in a balance-sheet for a larger amount than an authenticated market value of such security, then such balance-sheets do not record the true and proper position of the standing of the company; and, further, if any securities had been hypothecated with bankers or financiers as collateral security or cover for a cash loan, then such loan transactions ought to be properly shown by a distinct and relative entry on the balance-sheet.

A reserve fund does not mean that there exists cash available for investment, but a "*margin*" in reserve, in order to be able to cope with unexpected losses, or to equalize payments for dividends, or for some special purpose. When cash equivalent to the reserve fund has been invested, and such investment is calculated, or reckoned upon as being "convertible stock" in reserve, surely the estimated value of such investment should be truly and correctly figured out in the balance-sheet. One reason why investments should be verified, and a valuation made for each balance-sheet, is because shareholders and *some* directors consider these figures as being representative of a *present* sterling value.

I was dumfounded to read that "'Factotum' is complicating this question, and is introducing matters entirely foreign to the points originally raised." Therefore I must say that the explanatory remarks from a "Gas Accountant of Thirty Years' Standing" seem rather to confuse, than to afford any elucidation of, the direct questions set out in the two letters signed "A Secretary."

FACTOTUM.

March 16, 1893.

The Influence of Temperature and Atmospheric Conditions upon the Volume of Gases.—A correspondent has called our attention to an error in the article on the above subject which appeared in the JOURNAL last week as one of the series on "Coal Gas: Its Manufacture, Distribution, and Consumption," which are being communicated to our columns. He points out that on p. 456, col. 1, line 30, instead of "1-460th of the volume occupied at 32° Fahr.," the line should read "1-492nd of the volume occupied at 32°, or 1-460th at 0° Fahr." The error is set right in the second column, where a formula which involves the above correction is given.

Reduction in the Price of Gas at Harwich.—The Directors of the Harwich Gas Company have announced their intention of reducing the price of gas to 4s. net per 1000 cubic feet, from the 1st prox.

The Kirkleatham Local Board and the Stockton and Middlesbrough Water Board.—The Kirkleatham Committee of the Stockton and Middlesbrough Water Board reported, at the meeting of this body yesterday week, that the petition on appeal to the House of Lords against the decision of the Court, fixing the amount to be paid by the Kirkleatham Local Board to the Water Board at £8006, had been duly deposited on the 6th inst. Particulars of the claim for damages by reason of delay in the transfer of the pipes, fittings, &c., had also been received from the Kirkleatham Local Board. A resolution was submitted from the Middlesbrough Ratepayers' Association expressing regret at the action of the Board in connection with the supply of water to Kirkleatham, and their opinion that any further appeal was useless and against the interests of the ratepayers.

Accrington Gas and Water Bill.—In our "Parliamentary Intelligence" last week, we mentioned that the Bill promoted by the Accrington Gas and Water Company had been disposed of by the Select Committee of the House of Lords to whom it was referred. We are compelled to hold over a report of the proceedings; but we may state that, so far, the opponents of the Bill—the Accrington Corporation and the Local Boards of various neighbouring places—have been unsuccessful. The hearing extended over nearly three days—from the 8th to the 10th inst.; and there were a large number of witnesses and a strong array of Counsel. The Committee decided not to take any notice of the evidence given to the effect that the Company had failed, in the opinion of the ratepayers, to provide a sufficient supply of good gas and water, or of the fact that the Company had used revenue instead of capital for the construction of works. The Committee also ignored the demand of the petitioners that the illuminating power of the gas should be increased to 18 candles. Objections were further made, on behalf of the promoters of the Bill, to the submission of any evidence that had been obtained by the experts at the instance of the opponents; and they were upheld by the Committee, who decided that evidence could only be given from the published reports, and that the information supplied to the experts by the Company had been given in good faith, and ought not to be used against them. The Committee decided that the Bill should be passed without the insertion of the compulsory purchase clause; but that it should be without prejudice to the opponents in any future application they might make to Parliament for compulsory purchasing powers. It is understood that the opposition will be renewed when the Bill is in the Commons.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Bills last week:—

Bills reported, with amendments: Ilkley Local Board Bill, New Swindon Gas Bill, Staines and Egham District Gas Bill, Todmorden Local Board Gas Purchases Bill, Wolverhampton Gas Bill.

Bills read the third time and passed: Rathmines and Rathgar Water and Improvement Bill, Sheffield Corporation Water Bill, Stockton-on-Tees Corporation Gas Bill.

HOUSE OF COMMONS.

Friday, March 17.

EAST LONDON WATER BILL.

On the motion for the second reading of the above Bill,

Mr. STUART proposed that the Bill be read a second time that day six months. He explained that he adopted this course at the wish of his colleagues representing East London, and on behalf of the London County Council; objection being taken to both the substance and the essence of the measure. The Bill proposed to enable the East London Water Company to raise more capital to the amount of £500,000 by debentures, and this on the eve of a report of a Royal Commission appointed to determine certain very important questions with respect to the water supply of London. The Bill cut clean across all the points with which the Royal Commission had to deal. It was proposed to expend the money in obtaining an additional water supply from the Thames, from the Lea, or from wells; and every one of these questions was before the Commission. There was no urgent necessity for the measure. While the average supply of water in London in 1891 was 32 gallons per head per day, the supply by the East London Company was 35·90 gallons per head. Again, while the total storeage of the other Water Companies was equivalent to 7·9 days' consumption, that of this Company was equal to 14·9 days' consumption. This being so, there was no case for that urgency which alone could be a reason for pressing the Bill through the House of Commons immediately before a Royal Commission reported upon the whole question. A more important thing than the quantity of the water supplied by the Company was its quality, as this had more reference to a possible cholera epidemic. The Commission would report as to what sources of supply were to be condemned, and what sources encouraged. The expenditure now proposed ran the risk of being condemned; and therefore, if the Bill passed, London would have to face the purchase of the Company's interest with a dead limb.

Mr. BOULNOIS said the minority of the London County Council had no objection to that body opposing the Bill; but they thought the opposition should be raised before the Select Committee, and not on the second reading. It was not on the grounds laid down by the honourable member for Shoreditch (Professor Stuart) that the Council had been recommended by their Parliamentary Committee to oppose the Bill, but because of the petition of the consumers to a particular clause. They were told that the real ground of the opposition of the County Council was that the report of the Royal Commission had not been issued. He would undertake to say that the real ground was that the Council never lost an opportunity of making an attack upon the Water Companies, with a view to depreciating their stock, so that, if they should ever acquire their undertakings, they would be able to do so practically at the price of old iron. Over and over again representations had been made, and were still being made, by the Local Government Board as to the insufficiency of the storeage of water. In any case, he ventured to ask the House to pause before they summarily rejected the Bill upon the flimsy pretext brought forward by the honourable member.

Mr. MELLOR said the point to which he wished to call the attention of the House was this—that the House would, in his opinion, incur a very grave responsibility if they refused to send the Bill to a Select Committee. Although it might be true that the promoters were asking more than they should do, after all it was necessary to have a sufficient supply of water; and if the House rejected the Bill, one of the objects of which was to maintain an adequate service, they would incur very grave responsibility. This was one of the matters which ought to be referred to a Committee; and he hoped the House would follow this course.

Mr. BANBURY said he was authorized by the Company to say they were perfectly ready to withdraw the clause to enable them to stamp all fittings, upon which the opposition of the County Council appeared to some extent to be based. The Council objected that the Company were improperly seeking to charge to capital what ought to be borne by revenue. There was a Government Auditor whose duty it was to see that the Company did not do this. Therefore, he hardly thought it was necessary for the Council to interfere. They also objected that the Company had been asked more than a month ago to define the works on which additional expenditure was immediately necessary, and had not done so; but on the 2nd inst., they did supply every information on this point. It was absolutely necessary that, in an increasing district such as that for which the powers applied for were sought, the Company should make every provision. The population of the district in 1881 was 200,000; now it was 364,000—an increase of 164,000; and the whole of the district was outside the area administered by the County Council. In conclusion, he would merely point out that under the Bill the Company only sought to raise debenture stock, not ordinary share capital.

Mr. BENN said the County Council did not base their opposition on the clause referred to by the previous speaker; but they thought that, on the eve of the issue of the report of the Royal Commission, to add this financial burden to the purchase which must come sooner or later, would be very unfair.

Mr. A. SMITH, who also had on the paper an amendment for the rejection of the Bill, said he withdrew his opposition.

Mr. WARNER said that the feeling in the Essex district against the Bill was stronger, perhaps, than that of the County Council against it. He therefore hoped the House would put a stop to the Bill, as it did not aim at the benefit of the ratepayers and consumers, but at that of the Company alone.

Mr. WOOTTON ISAACSON said he felt with his constituents that the Bill was very premature, because everybody was looking forward to the report of the Royal Commission as to what was to be done in the East End of London. He thought it would be much better to postpone the Bill; but if that could not be done, he should support the proposition to send it to a Committee.

Mr. LONG said it was suggested that they should wait for the report of the Commission; but he would remind the House that the Commission would only report on two points—viz., the quantity and the quality of the water. It would be a serious thing for the House at this stage to take the unusual course of refusing to allow the Bill to go to a Committee, where the objections to it could be heard in detail.

Colonel HUGHES pointed out that £140,000 of the amount to be raised under the Bill was to be laid out in new mains; and even if the County Council did eventually take over the property of the Water Companies, these mains would be required. There had been an enormous increase in the district sought to be served; and it was surely impossible to say that the Council were to control, not only London, but also Essex.

A division was then taken, when the numbers were: For the second reading, 152; against, 176—majority against, 24.

The following progress was made with Bills last week:—

Bills read the first time, and referred to the Examiners: Rathmines and Rathgar Water and Improvement Bill, Sheffield Corporation Water Bill, Stockton-on-Tees Corporation Gas Bill.

Bill read a second time, and committed: Imperial Continental Gas Association Bill.

Bill reported: Altrincham Gas Bill.

HOUSE OF LORDS COMMITTEE.

(*Before Lord* HAMILTON OF DALZELL, *Chairman*; *Earl* STAMFORD, *Lord* WIMBORNE, *Viscount* BANGOR, *and Lord* NEWTON.)

Tuesday, March 7.

ILKLEY LOCAL BOARD BILL.

This Bill—which was promoted last year to empower the Ilkley Local Board to construct additional water-works, improve their existing supply, and purchase the undertaking of the Ilkley Gas Company—came to-day before the above-named Committee. It had been considered by a Committee of the Lower House, who granted the powers sought.* Being one of the suspended Bills, it had been formally passed through its preliminary stages in the Commons; but, the Company still opposing, it had been referred to their Lordships.

Mr. BALFOUR BROWNE, Q.C., Mr. FREEMAN, and Mr. WAUGH appeared for the promoters; Mr. PEMBROKE STEPHENS, Q.C., and Mr. FORBES LANCASTER represented the Gas Company.

Mr. BALFOUR BROWNE, in opening the case, said the Bill had two principal objects—the first, to construct additional water-works (but that part of it was unopposed); and the second, to purchase compulsorily the undertaking of the Ilkley Gas Company, and to make better provision for the health and government of the town. He explained that Ilkley was a place at which were resident a large number of gentlemen engaged in business at Leeds and Bradford, who were very anxious as to the last-named matter, which, more especially in relation to the gas undertaking, was the subject of great complaint. Of course, it was necessary to show that the public interest would be served by the transfer of that undertaking, as it would not be sufficient merely for the Local Board to say that they wanted to have the gas-works in their own hands. The promoters did not wish to confiscate the works of the Company. They proposed to pay, in fact, the fullest possible price for them. Offers had been made; and he was prepared to put a clause in the Bill saying that the works should be purchased on liberal arbitration terms. At the same time, he stood upon his right, as representing the Local Board, to say that the Company, not having properly performed the duty which Parliament imposed upon them, must be turned out, and their property handed over. The Company would not suffer, because they would have the full value for it; and the public would enjoy the benefit of better gas at a lower price. Having given the history of the Company, the learned Counsel said the Bill might be styled one for the compulsory purchase of the gas undertaking; but if it could be shown that it was in the public interest that the transfer should be made, it stood on the same basis as the taking of land compulsorily from a landowner. The promoters had to prove that it would be for the public good; and he would endeavour to do this. Before going into particulars, he might say generally that the Company had refused to meet the wishes of the Local Board unless they could see their way to very adequate remuneration thereby; and, moreover, they had tampered with their parliamentary powers. In support of the former statement, he cited the matter of the public lighting. In a town like Ilkley, where there were a great number of visitors, it was most important to have the main roads lighted. The Local Board had approached the Company upon various occasions, and asked them to light certain roads; and the Company had long stood upon their technical legal right, and refused to do so. To take an instance, there was one important road—the Ben Rhydding Road—leading to a large hydropathic establishment. The Board had asked the Company to light it. The whole cost of laying down the pipes for the purpose would have been, it was calculated, £90; and the return from the public lamps in the road would have been £5. But this did not satisfy the Company; and they had refused to lay a pipe, and so the road was unlighted. Another matter the Board had to complain of was as to the control of the lamplighters, who were paid by them, but controlled by the Company, and there were various complaints that the

*See JOURNAL, Vol. LIX., p. 1243.

lamps were not lighted soon enough, or that they were put out too early. This was a small matter, but it had caused much friction. Then the illuminating power of the gas was not satisfactory—being only 14 candles; and the pressure over the district, which was hilly, was very unequal. Since the inquiry in the House of Commons, the Company had reduced the price of gas; but they had so increased the pressure that the bills had actually gone up. Then there was another matter. The Company, of course, had power to break up the streets and roads. It was always an inconvenient thing to have one person responsible for the public thoroughfares, and another person breaking them up; and the Board thought a great deal of the difficulty would be overcome if this work were in their own hands. He would pass over small matters, and come to the main issue between the parties; and this was that the Company had made large profits, kept up their price, and "juggled" with their accounts. He would take one or two examples. In the accounts for 1890, which were those the promoters dealt with in the other House, and which he would take again now, because it was prior to the time that the negotiations began between the Board and the Company, they showed that the capital raised amounted to £16,466. But in 1890, they had spent £21,637. Where did the additional £5171 come from? This £5171 was equal to 24 per cent., or one-fourth of the whole capital. It came out of the consumers' pockets. It was profit which ought to have been divided between the shareholders and the consumers; in which case, the latter would have had a reduction in the price of gas. In any case, it ought not to have gone to the capital account. Passing on to deal with the Company's insurance fund, the learned Counsel stated that in 1881 the net revenue was £1819, out of which they paid dividends amounting to £1271, and they transferred £542 to the reserve fund, and £151 to the insurance fund. These three sums came to £1964, or much more than the net revenue. So that in that year the Company had no "clear profits," in the terms of the Act of Parliament, out of which to take the £151 for the insurance fund; and therefore this sum must have come from another source. The next matter on which the Company had gone absolutely wrong was the formation of their reserve fund. When they were promoting their Bill in 1879, they told Parliament that their reserve fund at that time, which Parliament said they might carry forward, amounted to £1210. But, notwithstanding this, when they obtained their Act, they brought forward £3239, or an amount of £2029 absolutely illegal. Then the Company had accumulated large balances—"floating balances" they called them—besides their reserve and insurance funds, which they had not divided; and in 1890 those balances amounted to £3163. These were not very large figures; but they were very important, when it was remembered that the whole amount of the capital raised was only £16,000, including premiums. This accumulation of large floating balances inured to the disadvantage of the consumers of gas. The learned Counsel went on to deal with other cases of disregard by the Company of their statutory obligations; and he concluded by asking their Lordships to say that the Local Board should become possessed of the gas-works—of course, upon proper terms of compensation to their owners.

The following witnesses were then called in support of the Bill:—

Mr. *M. Hainsworth*, Clerk and Surveyor to the Local Board, explained the causes which led to the promotion of the Bill, which was the result of the failure of negotiations to purchase the Company's works. The determination was come to on Oct. 5, 1891; and a Committee were appointed to deal with the matter. This Committee, in attempting to agree with the Company, arranged a meeting, which was held on Jan. 11, 1892, with the same result as before. The Board then proceeded with the Bill. In their view, it was of vital importance that they should become the owners of the gas undertaking. Under the Act of 1879, the Company had power to contract for the supply of gas for the purpose of street lighting. The Board, as the Local Authority, had endeavoured to obtain from the Company a reduction in the price of gas supplied to the public lamps, but had not succeeded. They were of opinion that the principal thoroughfares should be effectively lighted, but they were not; and the reason was the refusal of the Company to light certain roads, unless there was a prospect of a large return for the outlay. As to breaking up streets for the laying of mains, the Board held that it was not convenient to have two authorities possessing the power to do this, for the time selected by the Company was not the most convenient for the public. The work was generally done in the middle of April, when visitors began to come to Ilkley.

Cross-examined: Ben Rhydding Road was in the midst of very valuable building sites; and the Board gave the Company an order to lay mains there. It was a private road; but the public had a right of way over it; and he thought the precedent of the Company in laying down mains in similar roads would be sufficient. As to the price of gas, no reduction had been made to the Board for the public lamps. Several general reductions had been made; but he could not say exactly their amounts, or the dates. The meeting of the ratepayers to sanction the promotion of the Bill was largely attended. It was possible that the grievances now adduced against the Company were not "trotted out;" but what was laid stress upon was the advantage it would be for the town if the Board obtained the gas-works.

Mr. *Jabez Dobson*, the Chairman of the Ilkley Local Board, and proprietor of the Craiglands and Troutbeck Hydropathic Establishments, said he was one of the largest ratepayers and gas consumers in the town; his bill amounting to upwards of £230 per annum. He had cause to complain of the quality and pressure of the gas; and he had done so to the Company. In his public as well as his private capacity, he had found the supply unsatisfactory. He thought the faults he had had to complain of would be remedied if the works were in the hands of the Board.

Mr. *H. Garside*, a plumber, said he had been in Ilkley about 17 or 18 years, and had had considerable experience of the gas. He had been called in when anything had gone wrong with it; and complaints had often been made to him because people could not get sufficient light. The inhabitants of the houses had put in governors to regulate the pressure; but this would not have been necessary if the Company had employed district governors. There was a great deal of waste pressure—that was to say, considerable pressure without a corresponding amount of light.

Mr. *J. R. Maynard*, another plumber, said he had had complaints made to him about the deficiency and excess of pressure, and also as to the quality of the gas. He had been called in by consumers to remedy this condition of things.

Mr. *W. Hill*, the station master at Ben Rhydding, spoke to an extinction of about 50 of the gas-lamps at the station some two or three years ago; the houses in the neighbourhood being similarly affected. Last September the station lights went very low.

Mr. *J. Wilde*, a stationer at Ilkley, said his shop was in the centre of the town. He had 12 burners for the purposes of his business, and a similar number for his house. He had had occasion to find fault with the pressure of the gas, because he had not been able to get sufficient light. He put in larger burners; but they gave off smoke, and did more damage than he liked. Then he put in albo-carbon burners and reflectors. They did not look very pretty, but the light was pure. He had also two gas-stoves. He found that, when the lamps in the streets were lit, and the churches and chapels were open, the pressure in his house was reduced. It was never suggested to him that his meter was too small.

Mr. *J. T. Richmond* also spoke to the deficient pressure of the gas.

Wednesday, March 8.

Several additional witnesses were called this morning to give evidence similar to that adduced at the close of the preceding day; complaint being made by one that the gas bills of himself and his neighbour had increased to the extent of 20 and 30 per cent. since the reduction in price.

Mr. *E. Walmsley*, accountancy clerk to Messrs. Robinson, Scott, and Holmes, said that, with the object of enabling the Board to make an offer to the Company for the purchase of their undertaking, he examined their books in August, 1891. He extracted therefrom the following summaries: A general statement of the capital account for 34 years, and revenue account for 22 years, to Dec. 31, 1890; the state of the capital expenditure totals for each year to Dec. 31, 1890; the analysis of buildings and plant account, and analysis of the capital expenditure, and summary of receipts, and account of revenue in two periods—1869 to 1879, and 1880 to 1890. He found that, up to 1879, the revenue balances and reserve fund were all taken as one, and called reserves. Inasmuch as he had not had the printed balance-sheets of the Company before the year 1879, he could not speak as to what was done prior to that date. Since 1879, however, all the undivided profits formed part of the present reserve fund. In 1879, the revenue balances amounted to £606, and at the end of 1890 they had accumulated to £3163. He went on to point out other entries in the accounts which he said were contrary to the Act.

In cross-examination by Mr. PEMBROKE STEPHENS, witness said his employers were Solicitors to the Local Board.

Correspondence was put in between the Clerk to the Board and the Secretary of the Gas Company (Mr. Chas. Beevers) respecting the examination of the accounts. This went to show that the sanction to examine was given, provided it was confined to reasonable limits—six years. Questioned on this matter, witness said he did not know of this limitation until the Bill was before the Commons, when he heard the correspondence for the first time. As a fact, he went back into the accounts of the Company as far as the "fifties;" and the Secretary offered no objection, but gave him every facility. In his original report, he had called attention to these matters.

Mr. PEMBROKE STEPHENS: Was there one item or scrap of concealment, refusal, or underhand dealing of any sort?

Witness: No; everything was shown me that was asked for.

Straight, honest, and above-board?—Yes; I said so last time.

How long did you remain under the impression that the accounts were perfectly satisfactory?—Until after the Bill was introduced.

Mr. *C. Gott*, M.Inst.C.E., said that, having regard to the position of Ilkley, it would be advantageous to the place if the gas undertaking were in the hands of the Local Board, who had a staff of men and facilities for administering the concern with greater efficiency than the Gas Company could. There were numerous instances where Parliament had given to local authorities compulsory powers of purchase against the wishes of the existing companies; and there were cases in which provision had been made for the acquisition of gas undertakings should the authorities desire it. The latter, though they could not be said to be "compulsory powers," were so in effect.

The CHAIRMAN (to Mr. Balfour Browne): The accountant has withdrawn all imputations as to anything irregular in the Company's accounts? I mean there is no question of honour about them.

Mr. BALFOUR BROWNE: No; certainly not.

Mr. PEMBROKE STEPHENS: Perhaps my learned friend will withdraw the phrase "juggling with the accounts."

Mr. BALFOUR BROWNE: With great respect, that is a totally different thing from honour. I say the Company have acted illegally with their accounts. There is no question that what they did was *bonâ fide*; but it was in the interests of the shareholders, and not of the consumers.

Mr. *T. Newbigging*, M.Inst.C.E., was then called. He said he was distinctly of opinion that it would be advantageous to all parties if the gas supply of Ilkley were in the hands of the Local Board. The Board disclaimed any wish to obtain the property of the Company at a sacrifice to the shareholders; on the contrary, they were willing to pay a fair, and even a generous, sum for the undertaking. The Company took an exceedingly narrow view of their obligations, and were not accommodating in any way. Their ruling determination seemed to be to secure their "pound of flesh," and more. Witness then referred to the question of the public lighting, and to the absence of anything like efficient regulation of the pressure throughout the district, to show the "benighted" as well as "supremely selfish" spirit in which the Company acted in their dealings with the Local Authority and the inhabitants. They appeared to be possessed with the idea that they had been granted statutory powers over a certain area, in order that they might cater for their own exclusive benefit, and on no account to consider the public. This was a shortsighted policy, even viewed from the standpoint of the Company's own interests; and, in his opinion, the sooner the gas undertaking was out of their hands the better it would be. Passing on to deal with the Company's finances, witness said there

was a great deal that was reprehensible in their management of them; the same "grasping spirit" being exhibited. In support of this statement, he made the following remarks: In the printed accounts of the Company for the year 1890, I find that the expenditure on capital account exceeded by no less a sum than £5171 the amount of the paid-up capital and the premiums realized by the sale of new shares. In other words, about 24 per cent., or nearly one-fourth, of the total capital of the concern, amounting to £21,638, had been obtained from a source which I have no hesitation in saying is in contravention of the law. At that time, according to the same accounts, the Company had a reserve balance of revenue of £3163, a reserve fund of £4689, and an insurance fund of £755, or a total sum of £8607; being an amount equal to 39·77 per cent. of the capital professedly in reserve. There can be no doubt that the large balance of capital account which I have mentioned was obtained from this source, instead of being raised by the issue of shares in the prescribed manner—that is to say, the Company were employing money obtained from the gas consumers in enlarging and extending their works and plant. Knowing that the present Bill was being promoted, and foreseeing the possible exposure of their doings, the Company naturally took fright, and, hastening to "set their house in order," in the month of September, 1891, offered for sale, under the auction clauses, 410 shares. These realized £7626, of which £3526 was by way of premium. Last year 100 more shares were sold, fetching £2115, of which £1115 was the premium obtained. This total amount of £9741 appears in the accounts of the Company for 1892 as paying for extensions of works recently undertaken, and reducing the adverse capital balance to £221. The accounts for 1892 show a reserve fund, distinct from the floating balance of revenue, of £4894. To the larger portion of this fund in reserve the Company have no right whatever, as I will show. It appears that in the year 1879 this fund stood in the books of the Company at £3239. This clearly was far in excess of the sum to which they were entitled by way of reserve. Down to that year the authorized capital of the Company was only £12,100; and the reserve fund to which they were entitled, under section 31 of the Gas-Works Clauses Act, 1847, was one-tenth of the nominal capital of the concern—being equal to £1210, as against the £3239, or £2029 beyond what the Act of Parliament allows. In the year 1879, the Company were in Parliament and obtained their last Special Act. This Act authorizes the Company to raise further capital. It also includes the sliding scale of prices and dividends, and the auction clauses; and it contains the usual provision (section 16) as to a reserve fund. In the year but one following—*i.e.*, in 1881—the price of the gas was 3s. 8d. per 1000 cubic feet, which is a reduction of 4d. below the standard price; and the Company were then entitled to pay dividends of 11 per cent. on the original capital, and 8 per cent. on the new capital. These dividends they paid in full; and consequently they were not entitled to carry anything to the reserve fund. And yet, it will scarcely be believed, the Company in that year, contrary to law, carried no less a sum than £542 to the reserve fund, not "out of the amount of the divisible profits applicable to the payment of the increased dividend," as provided by the Act, but out of the excess profits of the year. The same policy was pursued in 1882. In that year the price of gas was again 3s. 8d., which admitted of their declaring 11 and 8 per cent. on the respective classes of shares. These dividends they again paid in full; and therefore they were not entitled to carry anything to the reserve fund. As a matter of fact, however, they appropriated a further sum of £302 to that fund. Adding together these several amounts—viz., 1879 and before, £2029; in 1881, £542; and in 1882, £302—we have a total of £2873, or a sum equal to 61 per cent. of the whole, which is rightly stigmatized as an illegitimate addition to the reserve fund, and made in direct contravention of the Acts of Parliament. Whatever may be said of the additions to the reserve fund in 1881 and 1882, it is certain that the £2029 excess added down to 1879 belongs to the consumers, under the provisions of the Gas-Works Clauses Act, 1847. At 5 per cent. compound interest during the 14 years that have elapsed since 1879, the £2029 would be about doubled; and this would wipe out the balance of revenue of £3963 claimed by the Company in their last statement of accounts. The carrying forward of the large balances of revenue, in addition to the reserve fund proper, is most unfair to the consumers, as will be evident from the following statement: The amount required to pay an increase of 1 per cent. dividend on the capital is £202; to allow of the Company paying this increase, the price of the gas must be reduced 4d. per 1000 cubic feet; and 4d. per 1000 cubic feet on the gas consumption of 40 million cubic feet amounts to £667—the two together being £869. It follows, therefore, that the balance of revenue of £3963 is equal to about 2s. per 1000 cubic feet on the year's sale of gas, and close on 2 per cent. extra dividend (extra on the present rates of 4 per cent. and 11 per cent.). For all these reasons, I am distinctly of opinion that the Company ought to be compelled by Parliament to dispose of their undertaking to the Local Authority.

Witness was cross-examined at considerable length by Mr. PEMBROKE STEPHENS; and the promoters' case then closed.

Mr. PEMBROKE STEPHENS intimated that, as the Committee had had presented to them so bad an account of the Gas Company, he would let their Lordships hear what other Ilkley people thought of the matter.

Witnesses were then called who expressed their general satisfaction with the gas, and their preference for the supply remaining in the hands of the Company.

Thursday, March 9.

This morning, evidence of a similar character to that adduced at the close of the previous day was given; one witness stating that the supply was "splendid," that there was plenty of gas, and that it was cheap.

The CHAIRMAN remarked that there had been a fair amount of evidence of this character on both sides; and he thought it might now be curtailed.

Mr. *C. Beevers*, chartered accountant, and Secretary of the Ilkley Gas Company, was then examined as to the various funds, and the forms in which the accounts were to be kept. From 1867 to 1879 the Company were under one system; and from 1879, under an entirely new one. In the latter year came the provision, in the Company's own Act, that any reserve or other fund existing at the passing of the Act might be added, and be invested in Government securities, and be called the reserve fund; and therefore the Company were within their legal rights in dealing as they had done with the money in question. The accounts put in by the other side did not show accurately the present condition of the finances; as the issue of the new capital did not appear at all. The annual statements had been forwarded year by year to the Local Board very closely on the lines laid down in the schedule to the Act. As to the additions to the reserve fund, these had been made in accordance with the Act. The first was in 1882—the amount being £542; and, in adding it to the fund, he thought he was carrying out the intention of the Act. In a subsequent year, £371 was added in the same way. Having explained the facts concerning the insurance fund, he dealt with the capital and revenue accounts. Mr. Walmsley, in his report, said: "Up to 1884, the revenue accounts have been kept up with a view to keep the revenue expenditure as low as possible. All that could be consistently charged to capital has been charged to capital, and a little over. Since 1884 this policy has been reversed." There had been no reversal of policy whatever. Witness went on to explain that there were many items charged to revenue account which they might have charged to capital; and, in adjusting the differences between capital and revenue, his effort had been to present an honest and *bonâ fide* statement of accounts.

Cross-examined by Mr. BALFOUR BROWNE, witness admitted that in several small matters the accounts had not been kept in conformity with the requirements of the Act of Parliament. But he said that the Act only specified that they should be "as near as may be," and this had been complied with.

Re-examined: The system on which the revenue and capital accounts had been kept was more in the interests of the consumers than that of Mr. Walmsley. Until after the Bill was introduced, and the refusal of the Company to sell, the Directors never heard a word of complaint as to the accounts.

Mr. *W. Wedgwood*, Manager of the gas-works, said that in 1879 the standard price of gas was 4s. per 1000 cubic feet; in 1881, it was 3s. 8d.; in 1883, 3s. 4d.; in 1885, 3s.; and it remained at this until last year, when a reduction was made to 2s. 8d. The standard illuminating power as 14 candles; but the gas usually made at Ilkley was of about 17-candle power. At first the Company did not pay large dividends; indeed, for a number of years they paid none. Speaking broadly, he had fulfilled, to the best of his ability, his obligations to Parliament and to the town. Until the question of purchase was raised, he did not have any complaint—written and tangible—from the Local Board. There had been questions between them with regard to Ben Rhydding Road and to the public lamps. The Local Board had tried to have a special price, lower than that charged to the ordinary consumers; but they did not get it. As to the lamps being lighted too late and extinguished too early, he worked to the weekly orders from the Local Board; and from the hours that were given, the rate of consumption was calculated. Practically, the Board had the control of the lighting so far as the consumption was concerned. The Board gave the orders; and he carried them out. As to the pressure, owing to the uneven character of the ground at Ilkley, this was very difficult to regulate. A great deal had been said about district governors; but he was opposed to them. He was of opinion that it was better for the consumer to control his own pressure by putting in a governor. Wherever this had been done, there had been no trouble of any kind. As to the lamps at Ben Rhydding Station going out, when he arrived there he saw a porter—not Mr. Hill—who said they had been pumping some water out of the syphons; and witness remarked that they should be very careful.

Mr. *C. Hawksley* gave evidence as to the character of the Ilkley Gas-Works, which, he said, were in excellent condition. The customary illuminating power was 15 candles; and if the average at Ilkley was 17½ and 18 candles, it was very good. The desire of the Board to have control of the lamplighters was not reasonable, as the Company should have some knowledge of the actual time the lamps were burning. In some cases district governors would be of service; but to put these in might require a rearrangement of the mains. He thought the consumers could themselves best remedy the evil of irregular pressure by adopting governors, than could the Company by putting in district governors. The cost of the maintenance and repair of the Ilkley works was only 3d. per 1000 cubic feet; whereas the average was 5d. He could not see any possible benefit that would accrue to the public by a change of hands in which the undertaking was held.

Cross-examined: The 3d. as against the average of 5d. as the cost of the maintenance and repairs might, at first sight, be an indication that things were not being kept up to the mark; but at Ilkley this was not the case. Asked, supposing a company had failed to do their duty to the public, whether this would not be a case in which he would say Parliament should interfere, witness said that, if it were a flagrant case, and there did not appear to be a reasonable prospect that in future the Company would do their duty, Parliament might see fit to transfer the undertaking to more capable hands.

Re-examined: Up to the present, he did not believe there was one precedent for a compulsory purchase where a gas company had resisted selling.

This completed the case for the Company.

Mr. PEMBROKE STEPHENS then addressed the Committee. He asked their Lordships to bear in mind the way in which the case was put before them, and to consider how far it had been borne out by the evidence. Having alluded to the means of redress which the Local Authority had, as laid down in certain Acts, should the Company not be discharging their obligations satisfactorily, he said the Company started in 1856, and since then had three times submitted themselves to Parliament. Consequently, there was no attempt at concealment; and he said respectfully that the Company had carried out to the full, in the opinion of the great unprejudiced body of the Ilkley people, the obligations of Parliament. The Local Board came into existence in 1868; and what had been their attitude towards the Company during the succeeding 25 years? In that time, the whole of the complaints sent in by the Board numbered three. One of these related to the lighting of Ben Rhydding Road, and another to a contract price for the public lighting. What, then, was the ground for the Board seeking to disturb

the Company? Not having any complaint as regarded the ordinary working of the concern, they tried to make good their case by such phrases as "juggled with the accounts." What was there in support of that charge? Until the Bill was before the Committee of the House of Commons, not a single suggestion was ever made that the accounts were wrong. In 1891, the Board made overtures to the Company for the purchase of the works. The Company said: "We don't want to sell." The Board said: "Oh! but we want to make you an offer;" and in order to enable them to do this, they said they wished to see their books and papers. This request was granted, provided the examination was kept within a period of six years. He ventured to ask, "Was that application made in good or in bad faith?" If it was made in good faith, six years was as far back as they needed to go. But, as a matter of fact, they went back to the very beginning—in 1856; and, on the examination of the accounts which was afterwards made, a report was submitted by the Accountant, who, however, failed to point to anything wrong until after the Bill was promoted. Having referred to the hardship it would be to the Company to have their powers taken away, he appealed to their Lordships not to allow the Bill to pass, alike on the grounds of want of precedent, want of evidence, and want of support in Ilkley.

Mr. BALFOUR BROWNE then addressed their Lordships on the whole case, and had not concluded when the Committee rose.

Friday, March 10.

On the resumption of the inquiry this morning,

Mr. BALFOUR BROWNE stated that since the previous evening the parties had come to terms, and the Company had expressed their willingness to sell their works to the Local Board—in fact, they had sold them, subject to an agreement. The arrangement was concluded as far as they could go; but certain formalities had to be gone through, and therefore he must ask for more time. He could only add that, if he had said anything to hurt the feelings of the officials of the Company, this was not his intention. He still said that they had acted illegally in several respects; but he would admit, as Mr. Beevers had told them, it was under a misapprehension of the law.

Mr. PEMBROKE STEPHENS explained that the reason for his clients fighting the case so strongly was the position assumed by the other side. Since the imputations against the Company had been withdrawn, it was possible to consider the matter in a different way. His learned friends, representing the promoters, had on the previous day, while the case was in progress, made them an offer which no wise owner of property ought to refuse. Under the circumstances, they could do nothing but accept.

The Committee then adjourned till the following Monday for the formal proof of the preamble and the settlement of clauses.

The Grimwith Reservoir of the Bradford Corporation.—The Bradford Town Council last Tuesday resolved to accept the tender of Messrs. J. and M. Hawley for the enlargement of the Grimwith reservoir and the construction of residuum lodges, in accordance with the plans of the Water Engineer (Mr. J. Watson), for £10,697. The capacity of the reservoir will be increased by 90 million gallons.

The Water Supply of Blandford.—In consequence of a report by the Medical Officer of Health (Mr. G. W. Daniell), the necessity of providing the town with a good supply of pure water has come prominently before the Corporation, and discussion arose as to whether the operations necessary to attain this end should be undertaken by the Council or be left to a private company. The result of the discussion was a public meeting of ratepayers, at which a resolution was passed supporting a Corporation scheme; but a subsequent poll of the inhabitants shows a majority of 209 in favour of a company doing the work.

New Joint-Stock Companies.—The Wymondham Gaslight and Coke Company, Limited, has been registered with a capital of £2000, in £5 shares. The Coal-Brick Company of the United Kingdom, Limited, with a capital of £50,000, in £1 shares, has been formed to acquire, develop, and turn to account certain patents connected with the utilization of coal dust and the production of heat, and, with a view thereto, to adopt and carry into effect an agreement made with the Coal-Brick Syndicate, Limited, and to carry on business as coal and coke merchants, briquette manufacturers, engineers and iron-founders, &c.

Compensation for Damages Resulting from a Gas Explosion.—During the carrying out of some extensive alterations in connection with the sewerage of the district of the Church Local Board, an explosion of gas occurred, by which damage was done to two houses, and the furniture they contained, belonging to two ladies. It was estimated that the injury done to the houses amounted to £93 12s. 3d., and to the furniture, by fire and water, to £74 15s. 6d.; making the plaintiffs' total claim £168 7s. 9d. The case was recently tried by Mr. Justice Charles at Manchester; and the evidence adduced led his Lordship to the conclusion that the explosion was due to negligence on the part of the Board in repairing a fracture in a gas-main. He therefore held them to be liable; but, judging the claim of the plaintiffs to be excessive, he gave judgment for £125 and costs.

Woodhouse and Rawson United, Limited.—With the consent of the Directors, Mr. Justice North has appointed Mr. Francis Drake Leslie (of the firm of Messrs. Robinson and Leslie) Receiver and Manager of Woodhouse and Rawson United, Limited, on behalf of all classes of the debenture-holders. A meeting of the shareholders was called for yesterday, to consider resolutions in favour of voluntary liquidation and reconstruction. It is understood that under the scheme the whole of the debenture-holders and creditors will be repaid by realizing a sufficient quantity of the available assets; the repayments being extended over two years. In this way the new Company will start clear of all creditors and first charges. The Directors have issued a long circular, in which they answer the Investigation Committee's points. It states that the holding in preference and ordinary shares of the Chairman and the immediate members of his family (other than the Managing Director, who has over £32,000) exceeds £6000.

MISCELLANEOUS NEWS.

SHEFFIELD UNITED GAS COMPANY.

The Half-Yearly Meeting of this Company was held yesterday week—Sir FREDERICK MAPPIN, Bart., M.P., in the chair.

The Directors' report and the statement of accounts (which were noticed in the JOURNAL on the 7th inst.) having been taken as read,

The CHAIRMAN moved their adoption. In doing so, he said that the total capital received to the end of the year 1892 was £745,066; and the expenditure on capital account was £683,699. Therefore they had a balance at that time of £61,367; capital not yet called up, £116,670; and capital remaining to be issued, £6744. This gave them a total of £184,782 yet to be called up, and the balance in hand. The reserve fund, which was not at its maximum, they were entitled to increase from £79,148 (at which it stood for some time) to £86,173. He hoped the occasion would soon arise when they would be able to so increase it. The capital expended during the six months had been of a normal character—£8177. The half-year's profits had not been sufficient to pay the maximum dividend on all the shares; and the balance of profit and loss account, including the sum of £540 brought forward, and the interest on the reserve fund, amounted to £33,236. Therefore, they had to take from the reserve fund £3469 to pay the dividend upon all the stocks. During the six months, they had received for gas £4204 more than in the corresponding period of 1891. They had also obtained an additional £664 for coke, and £1359 for sulphate and residuals of that class. Repairs of works had cost £1938 less; repairs of mains, £284 less; and stationery and printing, £332 less. This was the favourable side of the accounts. An unfavourable item—it was the largest, and he thought it ought not to appear—was a loss upon tar of £2856; and he believed if other gas companies managed their affairs judiciously, the Sheffield Company would not be subject to a serious loss of this kind. They had paid £713 more for coal, in consequence of the larger demand for gas. Salaries in the engineering department had increased by £531; surveyors and inspectors' department, by £632; and stokers' wages, by £382. This left an adverse balance between income and expenditure of £3469; and this amount had been taken from the reserve fund. As to the quality of the gas during the half year, he was sure it must have been satisfactory to all consumers; for it had been fully maintained. They had taken 925 tests; and these had shown the illuminating power to be 17·42 candles according to the "London" standard burner. Taking the whole year, 1850 tests were made; and these showed an average illuminating power of 17·40 candles. With regard to the consumption of gas, they had sold 40,822,000 cubic feet more than in the latter half of 1891, or an increase of 4·31 per cent. This was a very satisfactory indication that in Sheffield, at all events, and he thought in most other towns, gas was holding its own; and he believed it would do so in the future. The leakage had been 4·48 per cent. against 6 per cent. in 1891; and this, too, was a favourable feature. He had mentioned the large loss they had incurred upon tar. During the corresponding half of 1891, the average price of this product was 28s. 5d. per ton; in the six months ending Dec. 31 last, it was 18s. 8d.; and he was sorry to say that this year they were receiving considerably less even than that. He was glad to report that gas fires and stoves continued to increase in number. In 1888, they fixed 904; in 1889, 1106; in 1890, 1190; in 1891, 1504; and in 1892, 1843. The use of gas cooking-stoves had increased even in greater proportion; and as regarded gas-engines, he was pleased to say they were nearly quadrupled last year, as compared with the number used during the first year they were adopted in Sheffield. Most of the shareholders, no doubt, had seen the remarks made by Mr. Fowler, President of the Local Government Board, in reference to the cost of Private Bill legislation. He said that during the past six years local bodies had spent £473,000 upon Private Bill legislation, exclusive of all costs incurred in connection with Railway Bills; and he declared that "five-sixths of that legislation could have been more successfully carried out by means of Provisional Orders at comparatively little expense." The Directors thought as the President of the Local Government Board did. This was not the first time they had applied for a Provisional Order. They believed it was the right and proper course for local companies and local authorities to go before a Government Department, and place their case before them to judge upon it, without going to the enormous expense of employing scientific witnesses, who generally came pretty much to the same conclusions. At the present time, the Company had an Order under the consideration of the Board of Trade. Against it there were two objections from owners of cottage property; one from a large firm; and the City Council had also lodged an objection. The Company bought land from Earl Fitzwilliam (something like 9¼ acres in extent) 28 years ago; and they obtained powers to manufacture gas upon it. The remainder of the land (6¼ or 7 acres) they purchased last year; and they paid his Lordship a considerable sum for it. The Directors were, therefore, greatly surprised that his Lordship should object to the Order; but he (the Chairman) was glad to say his objection had now been entirely withdrawn. They had as yet no indication of what the decision of the Board of Trade would be; but they had no reason to suppose that the Order would not be granted. If there was to be any difficulty about getting it, he was afraid there would be only one course for the Directors to pursue; and that would be to raise the price of gas, for he did not think they would be disposed to reduce the reserve fund. He had already referred to the large loss the Company had sustained on the sale of tar. It was his intention to have spoken about the price at which tar was selling at the last meeting of The Gaslight and Coke Company; but he had an important engagement at Derby which it was impossible for him to forego. He noticed the Chairman of that Company stated at the meeting that, instead of adding £30,000 or £40,000 to the reserve fund, they were only able to place something like £500. Those of the shareholders who knew the history of that Company would remember that they raised the price of their gas from 2s. 6d. to 2s. 9d.; and that last year they made a further increase from 2s. 9d. to 3s. 1d. This added £265,000 to the income; and yet with all that addition, they were not able to place more than £500 to the reserve fund. And this was really not the whole case; for they did not earn

the dividend of 12 per cent. they paid by £21,334, which was taken from the balance brought from the previous half-year's account. He thought men placed in the responsible position of managing a large concern like that, and who could influence the market to so great an extent, should, in conducting their affairs, do something different than simply aise the price of gas to the consumers. That had not been the policy of the Directors of the Sheffield Company; and he hoped they would be able to avoid it. He had no doubt the shareholders would desire an expression of opinion from him respecting the progress of gas and electric light companies; and if they would allow him, he would give them shortly that opinion. First as to the progress of gas undertakings in this country. The capital invested in them in 1882 was £50,261,000; and ten years after, it had increased to £63,620,461. This, he thought, was a very large increase in the face of the electric light, which had been in progress during that time. The gas made in 1882 amounted to 66,614 million cubic feet; in 1892 it had increased to 99,870 million cubic feet—the increase being in a greater ratio than the increase in the capital invested. The electric lighting companies in the short period that the light had been before the public had not had the opportunity of investing so much money. In Great Britain alone, the registered nominal capital of these companies was £9,700,000; and the capital called up was £3,820,000, exclusive of the amount expended by municipal and local authorities and other public bodies who did not require to register. Although electricity was progressing to this extent, he did not think, so far as he was able to judge, that gas companies were in a position to feel its effects very much. Before concluding, he gave some particulars as to the working of the electric light in St. Pancras and Bradford; adding that, in his opinion, the shareholders of gas undertakings had no reason to fear that their capital would be at all jeopardized by that light.

Mr. J. W. HARRISON seconded the motion.

Mr. G. WILES inquired if the Chairman could explain how it was that the value of tar had decreased so much.

The CHAIRMAN replied that it was largely owing to the action of the Company to which he had referred that the value of residuals had gone down; and he hoped Colonel Makins would take into consideration some of the remarks he had made.

The motion was carried unanimously.

On the proposition of the CHAIRMAN, seconded by Dr. H. C. SORBY, a resolution was passed, declaring a dividend of 10 per cent.

The usual complimentary vote was passed to the Chairman and Directors; and the proceedings terminated.

THE ELECTRIC LIGHTING QUESTION AT BRIGHTON.

Board of Trade Inquiry.

As mentioned in our "Electric Lighting Memoranda" last week, a Board of Trade inquiry was held at Brighton on the 7th inst., by Mr. INGRAM B. WALKER and Major CARDEW, R.E., with reference to an application by the Brighton Electric Light Company, Limited, for a Provisional Order to supply electricity for public and private purposes within the borough.

Mr. CASTLE, Q.C., appeared for the Electric Light Company; Mr. FLETCHER MOULTON, Q.C., and Mr. W. L. G. BOXALL represented the Corporation, who opposed the application.

Mr. CASTLE, in opening the case, characterized the opposition of the Corporation as childish. Their first objection was that the Company did not themselves expect to carry on their business profitably within the area comprised in their Draft Order, and that their present application was merely made with the object of establishing themselves in a position in which they would be able to extort compensation from the Corporation. Their other objection was the fact that a similar application had been refused before by the Board of Trade. With regard to this statement, it seemed to him that anyone who had studied the history of the case would see at once that it was entirely uncalled for. The Company was the successor of the original pioneer Company which supplied electricity in Brighton long before any Electric Lighting Act was passed. In 1884 the present Company was formed. The Corporation had been granted a Provisional Order in 1883; but nothing had been done under it—the Company being allowed to continue the service without any interference, and the Corporation accepting a supply from them till 1889. This Provisional Order was actually recommended in that year by Major Marindin, after an inquiry at which the Corporation attended and said it was impossible to carry it out. The Order was, however, not granted; and the Company felt that they had been harshly treated in being refused upon a question of policy which was novel, and not considered to be the law of the land. Objection had been taken to the overhead wires; and it was said to be for the benefit of the town that they should be taken down as soon as possible, because they were a nuisance and a source of danger. His clients had been striving year after year to carry out the wishes of the Board of Trade by placing their wires underground. He claimed that his Company were the pioneers of electric lighting in Brighton; and that the opposition of the Corporation was an attempt to crush out a set of business men who had put £30,000 into the undertaking, and had amply supplied the town with electric light for many years. As showing that the ratepayers wanted the Company, whose business was increasing, he said that at the last inquiry they were supplying 4000 customers, and now 10,000; and they would endeavour to carry on the undertaking in face of the Corporation opposition and competition.

Mr. *R. Hammond*, Chairman of the Company, was then called. He said it was formed on Sept. 16, 1885, and was a *bonâ fide* business undertaking. The only system of supply they could then have was by means of overhead wires. The works, &c., of the Hammond Electric Light Supply Company were transferred to the new Company at a fair valuation. The Brighton business had been comparatively successful and continually increasing since the year 1884. The profit in 1886 was £516; in 1887, £721; in 1888, £532; in 1889, £529; in 1890, £768; and for the 15 months ending March 15, 1892, £1151. They had lost a number of customers, like the Grand Hotel, who would not sign the contract; but, had it not been for the opposition of the Corporation, this would not have occurred. There had been no attempt to oust the Corporation; and it was absolutely untrue that he knew the Corporation objected to the Company's overhead wires. The Company applied for a Provisional Order in 1889; and they tried to obtain the consent of the Corporation, but failed. The Corporation went to the Board of Trade, with the result that the Order was not granted. At the time of the inquiry, the Company had in Brighton 4358 lamps; 1364 being outside the compulsory area, and 2994 within it. They then had 58 customers inside, and 15 outside the compulsory area. On Sept. 15, 1891, when the Corporation commenced their works, the Company had 3773 lamps inside, and 1111 outside the area—a total of 4884. At the present time the figures were 7210 inside, and 1673 outside the area. In 1889 he received an order from the Board of Trade to insulate his overhead wires. On Dec. 16 of that year, a deputation from the Corporation waited on the Board of Trade, urging upon them the advisability of allowing the uninsulated wires to continue for a time. Had it not been for the assistance of the Corporation, the Company would have come to an end; for the Corporation helped them to carry on the undertaking for 18 months. The result was that they were able to tide over a difficult position. The Company had always tried to come to terms with the Corporation. In November, 1891, the Council were recommended by the Lighting Committee to purchase the Company's goodwill, &c.; the Committee, although considering the sum of £7500 which it was proposed should be given a large one, thinking the terms should be agreed to. Negotiations were, however, broken off. It was in consequence of the Company's belief that the Corporation were not going to undertake electric lighting that they doubled their generating plant twelve months ago. Running through the objections of the Corporation, witness denied that the Company had expended their money entirely on the speculation of defeating them. Last year they were perfectly willing to withdraw from the Corporation's area, provided they obtained some work outside.

Cross-examined by Mr. MOULTON, witness said the Corporation did not enter into negotiations for the sale of the Company's property; they were to keep it all, and only sell their goodwill. The Company's accounts were certified by public Auditors, and were regularly published. The 3000 shares were all paid up; and they had debentures of an equal amount, more than half of which were paid up, and the balance largely secured. He was Managing-Director of the House-to-House Company, the Sub-Companies connected with which applied in 1889 for a large number of Provisional Orders, but only obtained a few. The Company went for others in the following year. He was not prepared to deny the statement that they had seven Orders in that year, and that five of them had been revoked. He explained, however, that they had been revoked simply because the Company had failed to raise the capital. The Brighton Electric Light Company made special terms with special consumers.

Mr. MOULTON: You talk about yours being the best and safest system? You have been somewhat unlucky; you have killed three men, have you not?

Witness said he had not used the word "safe," though if the wires were underground and insulated, they would be perfectly safe.

Mr. CASTLE pointed out that all the men referred to had not been killed by electricity.

Re-examined by Mr. CASTLE, witness said that, if the Order were granted, he did not think he should have any difficulty in raising the necessary capital. He had carried out, or was carrying out, large and important works of a similar character under Orders from the Board of Trade—at Dublin, Leeds, Burton-on-Trent, and Blackpool—and also some in Madrid.

Mr. *Sadler*, proprietor of the New Ship Hotel, and Mr. *Heath*, expressed satisfaction with the light supplied by the Company.

Mr. *H. Lundy*, lessee of the Brighton Alhambra, said he gave up the supply of electricity by the Corporation in the Alhambra at the time he took his present short lease, because he believed the Corporation meters registered against the consumer. He had them tested, and produced a certificate from the Electrical Standardizing and Testing Institution, which stated that the meter registered 20 per cent. too high. The Company's light gave every satisfaction, and the cost per week only came to between £5 and £6; while the light supplied by the Corporation had averaged £40 a month. The same number of lamps were being used; and he considered the Corporation's charges were about 50 per cent. higher than the Company's.

In cross-examination by Mr. MOULTON, witness acknowledged that a cheque for £40 16s. 6d. given by him for the October electricity account had been returned dishonoured. When he took over the hall, the Corporation asked for a deposit; and it might have been after that that the meter was tested. He did not know that the Electrical Standardizing and Testing Institution was one of the numerous "children" of Mr. Hammond. He was not quite certain whether the number of lamps had not been reduced since he took over the hall. He did not know if any complaints had been made about the meter; but there were some by the Directors of the Alhambra Company, now in liquidation, about the cost of the light. He was charged 6½d. per unit by the Electric Light Company.

Mr. *Sutton* said that he had applied to the Corporation to be supplied with electricity, but had been refused, although he was within about 60 yards of the original area.

In cross-examination, witness acknowledged that he was told that, unless a considerable number of the residents in the neighbourhood also wanted the light, his application would not be submitted to the Corporation.

Mr. *Botham*, one of the Directors of the Brighton Empire, stated that they tried to get the electric light from the Corporation, whose terms, however, were so prohibitive that they could not do so. In the interests of the shareholders, they had procured light from the Company. They were large consumers, and were satisfied with the light.

Mr. MOULTON: Are you paying less than 7d. per unit for the light.

Witness: A very great deal, Sir.

Mr. *G. W. Spencer Hawes*, Secretary of the Company, stated that the Empire was supplied with the current at 6½d. per unit for the night, and 3d. per unit for the day supply.

Mr. CASTLE produced a petition to the Board of Trade, signed by ratepayers and consumers alike, in favour of the Company. He said

the document showed that the Corporation not only tolerated, but encouraged the Company's undertaking. It concluded by urging that either the Corporation of Brighton ought to be allowed the monopoly of electric lighting within the borough by acquiring the existing business of the Company on fair and reasonable terms, or the Company should be granted the powers applied for, to enable them to continue the business. None of the signatories were shareholders in the Company.

Mr. MOULTON, in addressing the Inspectors on behalf of the Corporation, said that Parliament had from the very first taken up this position—that, if the public preferred to supply themselves with such articles of consumption as gas and water, so as to relieve the burdens of the ratepayer, they might decline to allow enterprises such as that of the Company to be made the subject of private property, private persons, or private companies. He reviewed the circumstances under which the inquiry by Major Marindin was held, and read correspondence between the Corporation and the Board of Trade with the view of showing that up to 1889 the Council had already spent £6000 on an installation at the Royal Pavilion, and that they intended to put into operation the powers obtained by them under the Order of 1883 as soon as a satisfactory system was available. His learned friend had not shown the shadow of a case of the Corporation having failed to come up to all they represented to the Board of Trade. There was no ground, therefore, for accusing them of not carrying out what they had undertaken. The system adopted by the Corporation was one that was preferred by all who had had a chance of comparing it with others. They had extended their area as much as they could; and then they obtained £32,500 for the purpose of laying down the mains. The actual sanction for raising this money was given in July, 1890. The Corporation at once proceeded to spend it; and in the following year they commenced the supply. In that year the Company gave another notice that they were about to apply to the Board of Trade for a Provisional Order. In March, 1892, when the Corporation were supplying electricity, the decision of the Board of Trade was as follows: "The Board of Trade is not disposed to so far interfere with the exercise of the discretion placed by the Legislature in the Municipal Authority." In April, a month afterwards, the Corporation applied for a further loan of £8500; making £41,000 of the town's money invested. Since then, in December last year, they had extended their area of supply, and application had been made to the Local Government Board for their sanction to raise over £37,000; so that there would be about £80,000 of municipal money invested in these works. Nobody doubted that, if electricity was to be supplied cheaply and efficiently in Brighton, it was far better that it should be in the hands of one body than of two, because the cost would rapidly diminish with the increased supply. The Brighton Corporation had decided to keep the supply in their own hands. They had invested a great deal of money in it; and why should they not have the privileges which Parliament considered they ought to have?

Mr. *A. Wright*, Electrical Engineer to the Corporation, said he was appointed in November, 1891; but prior to that he had been connected with the Company in the same capacity. The total length of mains now laid and being laid was nine miles. The Corporation were running mains in every principal thoroughfare in their area. The Order provided that the consumer should be charged only for the quantity of current used. After Jan. 1 last, there was a decrease in the price charged after two hours' consumption per day. Last year the revenue exceeded the expenditure by a slight percentage; showing that the undertaking was self-supporting. The business was twice as much as it was last year; and the Corporation had double the number of customers, and were consequently generating twice the quantity of current. They had received no complaints as to the supply.

In cross-examination, witness said he considered the high-tension more dangerous than the low-tension system; and the sooner the wires were put underground, the better. At present there were 11,000 lamps; and the mains were capable of lighting 30,000.

Mr. CASTLE (glancing at the Corporation account of the works): At a cost of £50,000.

Witness: No.

It is proposed to borrow £37,000 more. What is that for?—New plant and mains.

Mr. CASTLE said he noticed, from the accounts, that the balance brought from the revenue account was £2221 6s. 1d., or 50 per cent. profit on the gross receipts. He also saw that £25 3s. 10d. was put down for the repairs of machinery and maintenance of machinery and plant. He asked witness whether anything had been charged for depreciation of machinery.

Witness replied in the negative.

Mr. *R. E. Crompton* and Dr. *Hopkinson* expressed the opinion that the system being carried out by the Corporation was a satisfactory one.

Mr. MOULTON then summed up; contending that, since the year 1889, nothing had occurred which tended to justify the supply of electricity being taken out of the hands of the Corporation, while there had been overwhelming reasons why it should be left in their hands.

Mr. CASTLE, in reply, said the real point to be kept in view was that the petitioning Company could not be turned out. If the Board of Trade refused to grant this application, the Company could not go on applying for ever. They must then continue with their present system, which was said not to be safe. The Company had supplied a large public want, had done good work for the town, and had put £30,000 into the electric lighting business for the good of Brighton. They should remember that they could not get rid of the competition by refusing to grant the Order. He knew a great many of the Corporation had said *in camerâ*: "This is a dying concern; just wait till it is dead, and then let us pick its bones." But it was not a dying concern; and it would continue to supply electricity outside the Corporation area, and along the streets where the Corporation refused to go.

The inquiry then terminated.

Cutler's Patent Guide-Framing for Gasholders.—The Rochdale Corporation recently advertised in the JOURNAL for tenders for a new four-lift gasholder. We learn that Messrs. S. Cutler and Sons, of Millwall and Westminster, have secured the order, and are to apply to the holder their patent spiral guide-framing.

WIDNES GAS AND WATER SUPPLY.

Increased Gasholder Capacity—Reduction in the Price of Gas—The Value of the Dinsmore Process—Alteration in the Charge for Water.

At the Meeting of the Widnes Town Council last Tuesday—the MAYOR (Mr. Alderman Gossage) in the chair—the minutes presented by the Gas and Water Committee contained the following recommendations: That the plans submitted by the Engineer (Mr. Isaac Carr) for a tank and three-lift gasholder, having a capacity of 605,000 cubic feet, and estimated to cost £7000, be approved and adopted, and that tenders be invited for carrying out the work; that, from and after the 25th inst., the price of gas to consumers within the borough be 2s. per 1000 cubic feet for quantities below 3 millions per annum, and 1s. 10d. above this—less 2d. discount per 1000 cubic feet in each case; and that (subject to a special provision affecting the United Alkali Company, Limited) the rates to be charged for water to be used for other than domestic purposes after the above-named date be 2d. net per 1000 gallons for quantities above 50 million gallons—the arrangement not to come into operation until the Alkali Company enter into an agreement with the Corporation that they should not be entitled to be supplied at this rate except in respect of a quantity in excess of 50 million gallons in the aggregate in any one year.

Alderman TIMMIS, in moving the confirmation of the minutes, explained, in regard to the first recommendation, that the present gasholder capacity only allowed of a storeage of sufficient gas for about fifteen hours; [and the Committee therefore proposed to put up at Ditton a new holder which it was calculated would meet the requirements of the town for twelve years. Passing on to the subject of the price of gas, he said the profit on the gas undertaking last year was £2600; and the estimated profit for the present year, despite the loss on coke and residuals, would be £2240, which was owing to the Committee being able to save something in their coal bill. What they proposed to do was to make a reduction to the gas consumers of 2d. per 1000 cubic feet, which would absorb £1000, and still leave a profit of £1240 in the hands of the Council. It might interest some present to know how they could show a profit this year, when 110 of the largest towns of the country, except four, had had to increase their charge for gas in consequence of the advance in the price of coal and the decrease in the value of residuals. At Widnes they had had to fight against the same things; but they employed the Dinsmore process, and he believed other places were watching them with interest, because he understood Widnes was the only town which was able to work the process—a result entirely due to the ability of their Engineer. By using this process, they had been able to effect a large saving in their coal bill as compared with other towns—a saving which meant upwards of £1000 per annum to the Committee. Thus, while other towns had been increasing their charges by from 2d. to 4d. per 1000 cubic feet, at Widnes they would be able to show a profit after reducing the price. He thought he had said enough to show that they were really in a position to lower the price, and that it would be for the benefit of the town generally if they were able to sell more gas. With regard to the price of water, this was a more difficult matter. It was not a question of profit, but of dealing with the surplus supply. The Corporation had engines and power to pump 5 million gallons of water per diem; whereas they were only pumping 2½ million gallons. It was necessary that they should keep their revenue intact; therefore they did not propose to deal with its present basis. They simply had a surplus of water, which represented so much capital on which they received no interest; and the question was at what price they could sell the surplus so as to cover the expense, and perhaps put a little into their pockets, while at the same time they were benefiting the manufacturers and the town. It had been proposed that they should approach the present consumers of water, and try and induce them to take more; but they could not do this to the problematical people who might come to Widnes. The people to be approached were those who used wells—to induce them, by offering substantial advantages, to close their wells and take more of the town's water. He thought the scheme the Committee had drawn up would be accepted; they having suggested a price which they thought was right at the present time, and left themselves free to draw back if necessary.

Alderman WAREING seconded the motion.

In the course of the discussion,

Mr. SMITH expressed regret that he could not support the recommendation to reduce the price of gas, which he said was already lower—thanks to their Engineer, his excellent staff, and those who supervised them—than in other places like Widnes, where the manufacture of chemicals was carried on.

Alderman TIMMIS, replying, explained that the increase in the consumption of gas was entirely owing to the new consumers, who had enabled them to show such a profit this year; and they trusted that, in lowering the price, they would bring in many new customers, and continue to show the same profit as at present.

The minutes were passed—Mr. Smith alone dissenting.

[It may be mentioned that the reduction above recorded brings the net price of gas at Widnes down to 1s. 10d. and 1s. 8d. per 1000 cubic feet. As, however, the whole cost of the public lighting is paid for out of the profits on the gas undertaking, the actual average receipts over the year, with this reduction, are 1s. 6·15d. per 1000 cubic feet; being, we believe, the lowest price at which gas has ever been sold.]

Improvements in the Water Distribution System at Liverpool.—The Water Committee of the Liverpool Corporation have recently had under consideration a preliminary report of the Water Engineer (Mr. J. Parry) in respect to additional works to be undertaken for improving the means of distributing the water in the city. As the Committee are desirous of proceeding as quickly as possible with the carrying out of operations, in order to give employment to workmen in the district, they resolved to instruct the Engineer to obtain tenders immediately for the iron pipes required in connection with three of the works. These include new lines of main-pipes to the Kensington reservoir and the completion of the mains to the Parkhill reservoir, in Toxteth Park, and will involve a total expenditure of about £90,000.

LEICESTER CORPORATION GAS AND WATER SUPPLY.

The Half-Yearly Balance-Sheets.

At a Special Meeting of the Leicester Town Council last Tuesday—the MAYOR (Alderman Underwood) presiding—the Chairmen of the Gas and Water Committees presented their usual half-yearly financial statements.

Alderman LENNARD, in moving the adoption of the report of the Gas Committee, remarked that the net profit for the half year ending Christmas last was £14,143, from which they were compelled to pay a contribution to the sinking fund for the six months of £3262, leaving a net profit at the disposal of the Council of £10,881. This, with the amount arrived at in the same way for the previous half year of £9518, made a total disposable amount from the Gas Department of £20,399. It seemed to be a common belief that the department could make money almost anyhow, and that it was a very profitable affair. But when he told them that the total profit, reckoning the 3½ per cent. interest they had paid on their stock, and counting the sinking fund as profit, and the balance they had to hand over as profit—putting all those together, they only yielded a return of 7·14 per cent. on the invested capital, it would not be thought too much. The business was a big one, and £200,000 seemed a nice round sum; but it was not big when compared with the enormous capital they had invested there. They had a larger capital than almost any concern in the country. This arose from the fact that they had paid something like £200,000 for the goodwill when they took it over. But for this, the profits would be £8000 a year more; and even then they would not be getting 10 per cent. for their money. The most interesting part of the balance-sheet after that was the revenue account. For comparison, he took the corresponding period of 1891; and it would be seen that the expenditure on the revenue account in the last six months was £59,353, against £58,058—an increase of only £1296. They kept the expenses down as well as they could, and increased the revenue as much as possible. The additional expenditure was made up of £550, extra cost of coal; £375, extra cost of purifying; £126, increase in wages; and £770 in rates and taxes. There had been a decrease in certain items of expenditure, mainly in repairs and maintenance. Turning to the other side of the account, the receipts amounted to £86,324, against £82,757—an advance of £3567. The increase of revenue from gas was £4412, notwithstanding the fact that the new districts had had their supply at a reduced price; and they lost £500 or £600 every half year on this account alone. The residuals, generally speaking, governed the annual profits. In the past half year their coals cost them, on an average, 11s. 7¼d. per ton, and they realized by the residuals 5s. 9½d. per ton of coal carbonized; so that practically 50 per cent. of the cost of coal was repaid by the price obtained for residuals. In round figures, coke produced 3s. 5d.; tar, 1s. 1d.; and ammoniacal liquor, 1s. 2d. Tar yielded 18s. 1½d. per ton, as against 8s. if they had sold it in the market as tar, and liquor 9s. 8d. per ton, against 5s. 6d. if they had not worked it up. For the whole year, they had realized 52 per cent. from the residuals. In 1889, they made 74 per cent. on the residuals; in 1890, 80 per cent.; while in 1891, it fell to 52 per cent. This showed the condition of things they had to fight against in those falling markets.

Mr. BILLINGS seconded the motion, remarking on the exceedingly satisfactory nature of the report.

The motion was adopted.

Mr. COLEMAN, in moving the adoption of the report of the Water Committee, stated that the net profit for the half year had been £5700, which, added to the balance of net profit (£5526) for the six months ending June 30 last, made a total of £11,226 to be devoted in aid of the rates. This was not the largest sum they had ever handed over, because in the previous year they were able to devote £200 more. This year, however, they had had a little extra capital which had not been productive; and they had had an extra expenditure which would not come every year. They had had to divert the water-main from off the sewage-treated area of the Beaumont Leys Estate, which cost £2642, of which £642 had been paid out of revenue.

Mr. BILLINGS seconded the motion, which was adopted.

REGENERATOR FURNACES AND INCLINED RETORTS IN GAS-WORKS.

In the extensions which have been carried out in gas-works during the past few years, the special features have been the adoption of regenerator furnaces and settings of inclined retorts. Conspicuous among the former arrangements stands that devised by Mr. George Winstanley, Assoc.M.Inst.C.E., Gas Engineer of the Coventry Corporation, of which a description appeared in the JOURNAL some time ago. It has been adopted in a number of works; and therefore a few particulars as to its operation therein may be of interest.

The Gas Committee of the Tipton Local Board have had to make extensive alterations in their plant, in order to meet the growing demands for gas in their district. When these changes were under consideration by the Committee and the Gas Engineer (Mr. Vincent Hughes), it was decided to continue Mr. Winstanley's system of regenerative retort-settings, which had already been in use in the works for some two years, with excellent results, and extend it to the whole of the retort-bench. In order to carry out this work, the foundations of the existing arches were cut away, and the walls underpinned to the necessary depth, when it was found that there was no visible settlement in any part. The working of the settings has given every satisfaction—uniform temperatures, increased make of gas per ton, and less wear and tear—the whole arrangement being exceedingly simple and under perfect control. There are now at Tipton 56 retorts, or 112 mouthpieces, 20 in. by 16 in., heated on this system, making 8000 cubic feet of gas per mouthpiece per day. Each regenerator uses, on an average, 10 lbs. of coke per 100 lbs. of coal carbonized; but, according to experiments extending over some little time with the coal carefully weighed, as also the coke supplied to the furnaces, the fuel account is 9·75 lbs. per 100 lbs. of coal—the illuminating power of the gas being 17½ candles. There were further extensions necessary, which Mr. Hughes advised his Committee to carry out—viz., the erection of a two-lift gasholder 100 feet in diameter, a washer-scrubber to deal with a million cubic feet of gas per day, and other plant.

Among other places in which the above-mentioned system has been adopted, with equally satisfactory results, is Carlisle. After seven years' use, the Gas Engineer (Mr. J. Hepworth, M.Inst.C.E.) testifies to its good working. The durability of the retorts (92 mouthpieces) is quite as great as, if it is not even greater than, in the ordinary settings; and the heats are maintained with a fuel consumption of 11 lbs. to 12 lbs. per 100 lbs. of coal carbonized. In this case the fuel is not, we believe, of very good quality; but with a better kind, and a different class of coal, these figures could, no doubt, be reduced. At Burslem, Mr. Peaty has produced some really extraordinary results. The coal he uses is poor stuff; yet, working with six-hour charges, he obtains 7000 to 8000 cubic feet of gas per mouthpiece. He has even exceeded 10,000 cubic feet per ton from the very inferior raw material with which he works. His heats are remarkably even, and perfectly under control; and as these good conditions are attributable to the regenerative system, he acknowledges his indebtedness to it. At Stratford-upon-Avon these furnaces have also been doing good work for six years and a half. The fuel account here has been about 12 per cent.; but the Engineer (Mr. J. S. Cranmer) is not an advocate of high heats, or this figure could be reduced and the yield of gas per mouthpiece increased. At these works the settings are single; if the retorts were "throughs," further economy would be possible. However, Mr. Cranmer obtains 7000 cubic feet of gas per mouthpiece; and with this he is satisfied. He is confident, however, that 8000, or even 8500 cubic feet could readily be obtained, if the question of wear and tear were not considered to the extent it is with him. He testifies to the small amount of attention required by these furnaces.

The other feature of gas-works extensions above referred to—the adoption of inclined retorts—is gradually becoming more prominent in improvement schemes. Where it is in contemplation to introduce these in place of horizontal retorts, the regenerative system of heating of which we have given the foregoing particulars may be commended to notice as being specially well adapted for the purpose.

Rochester and Strood Water Supply.—We learn from our local correspondent that the enlargement of the Strood Water-Works is now completed, and that with the new plant the Rochester Corporation will be able to supply the whole of the city as well as Strood; and it is anticipated that, instead of joining Chatham and Gillingham in the acquisition of the Brompton, Chatham, Gillingham, and Rochester Water-Works, the Corporation will apply for a Provisional Order in respect of their works at Strood, and leave Chatham and Gillingham to do as they please.

Dover Gas Company.—The half-yearly general meeting of this Company was held on the 6th inst., under the presidency of Mr. Willsher Mannering. The report stated that the profit realized in the six months ending Dec. 31 last (£3021) was sufficient to pay the full statutory dividend at the rate of 7½ per cent. per annum, and leave £316 to be carried forward. In moving the adoption of the report, the Chairman referred to the good working results achieved by Mr. Herring, more gas having been made and sold than in any previous half year. There were 8164 tons of coal carbonized, against 8045 tons in the corresponding half of 1891; the quantity of gas made being 90,913,000 cubic feet, or 11,138 cubic feet per ton, and that sold and accounted for, 84,859,000 cubic feet, or 10,394 cubic feet per ton. The increase in the sale of gas was at the rate of 4 per cent. These satisfactory returns were obtained without any expenditure for cannel; this enriching material having been entirely replaced by oil. The cost of coal was 9d. per ton less than in the second half of 1891—a saving of rather more than £300. But the advantage was entirely lost owing to the great depreciation in the value of tar, which produced £237 only, against £596—a difference of £359. The report was adopted.

Defrauding the Sheffield Gas Company.—At the Sheffield Town Hall last Thursday, John William Jones, of No. 106, Clay Street, Attercliffe, was summoned for stealing a quantity of gas belonging to the Gas Company. Mr. W. E. Clegg, who represented the Company, said on Tuesday Mr. F. W. Stevenson, the Engineer, Mr. W. Watson, superintendent of the gas collectors, and Mr. G. W. Greaves, one of the meter inspectors, visited the defendant's house, and told him they had come to inspect his meter. The defendant immediately rushed into the cellar; but the Company's officials, following close behind him, were just in time to see him trying to detach a lead pipe from the meter. They prevented him accomplishing his purpose; and, on an examination, they found that he had made an arrangement with a piece of lead pipe, whereby gas could be introduced into the house without having to pass through the meter and be registered in the usual way. At first the defendant denied that he was the occupier of the house; but subsequently he admitted that he was, and also that the fraud had been going on for two or three weeks. Mr. Clegg characterized the fraud as a most ingenious one, as the pipe which conducted the gas from the main past the meter could be easily detached; and thus the fraud would not be apparent when the meter was being examined. He added that the case was a very bad one indeed. The defendant's next-door neighbour had the same sort of shop, and burned a similar quantity of gas. A comparison of the accounts for the last December quarter showed that the defendant's meter had only registered 1300 feet of gas, against the legitimate registration of 9300 feet by his neighbour's meter. He asked that the defendant might be fined the maximum penalty. Defendant pleaded guilty, and said he had spoken the truth when accused of the fraud. He had been having "hard times;" and he hoped the Magistrates would deal leniently with him. The Chairman (Mr. A. M. Chambers) said it was a very serious offence; and it was only just recently that Magistrates had power to fine in such cases, instead of committing to prison. The defendant would be fined £5, including costs, or in default one calendar month's imprisonment.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Edinburgh and Leith Gas Commissioners held their statutory annual meeting on Monday of last week; and, for the first time since they came into existence, they managed to get some business to transact at it. I mentioned a fortnight ago that the Commissioners had instructed a Sub-Committee to inquire into the charges which Mr. Wells, a former member of the Commission, had made with reference to the monthly reports as to the quantity of gas manufactured at the Edinburgh works. At this meeting, however, the Sub-Committee reported, through the Works Committee, that, in view of the letter from Mr. Wells's Law Agents, which was read to the Commissioners at their previous meeting, repudiating the interpretation which had been put upon his words, no further action should be taken beyond entering the letter in the minutes. This recommendation was adopted; and the affair, which might have been a troublesome one, is at an end. It is well that it is out of the way; but, when the lofty tone of the Commissioners at previous meetings is taken into account, it looks like "climbing down" on their part to accept so mild an apology from Mr. Wells. Reference was made to the acquisition of land beside the Leith works, to which I alluded last week; everyone agreeing that a most fortunate purchase had been made. The other business was of a formal nature. In the evening the Commissioners held their annual dinner. After-dinner oratory is usually of little consequence for a technical publication; but there was one statement, made by Mr. Gibb, the Treasurer to the Commissioners, which is worth noting. He said that, while a great deal of correspondence and complaint had apparently been prominent in the newspapers and elsewhere, as an official who had experience under both the Companies and the Commissioners, he could truthfully say that fewer complaints had been received during the last year or two in regard to the gas and cognate matters than he had occasion to deal with during the management of the Companies. This is very satisfactory; and it shows upon what a hollow superstructure flaming complaints by newspaper correspondents, often anonymous, are frequently based.

Professor A. W. B. Kennedy, of London, whom the Corporation of Edinburgh asked to advise them regarding their proposed electric lighting scheme, has given them a nut which they find it hard to crack. In his report, which is described as a preliminary one, the Professor states that he examined the northern half of Edinburgh, and found that in the scheduled streets there is a total length of about 12,000 yards, of which about 10,700 yards consist of frontage which might be productive. Outside of these streets, something like 10,000 yards of other productive frontage might be had. Being familiar with the district, on account of several years' residence in Edinburgh, he calculates that there might be a demand for a supply for from 150,000 to 200,000 8-candle lamps; and he estimates that, in three years after opening the station, there would possibly be 40,000 lamps wired. These, at 6d. per unit, would bring a return of 8s. 6d. each lamp per annum, or a total revenue of £17,100. His preliminary estimate of the cost of a station, exclusive of land, &c., is about £85,000, though he thinks it probable that more careful estimates might very considerably reduce this figure. He assumes that the system of supply should be one in which the consumers would be connected directly to a low-tension network of distributing-mains. He calculates the cost of production at 5·4d. per unit; and he reccommends that the Corporation should charge 6d. per unit. He does not entertain any doubt that the supply of electricity in Edinburgh would prove exceedingly profitable, owing to various local conditions, "among which the price of gas cannot be forgotten," *if it is thoroughly well managed* (the italics are mine). He does not make any recommendation as to the comparative advisability of the Town Council taking up the matter themselves, or handing over their responsibilities to a company—his report being intended as part of the data on which this question would be decided; but he urges strongly that, if it be determined to pass the work on to a company, it should be an absolute condition that it should be a *bonâ fide* local supply company, and altogether free from any conuection whatever with contractors, even those of the highest repute. The report is approved by Mr. David Cook, of London.

The electric lighting installation of the Dundee Gas Commission was formally inaugurated last Wednesday night. At present there are 40 customers taking energy; and the High Street is lighted by four arc lamps. The capacity of the station is 6000 lights of 16-candle power; but it is capable of extension so as to produce 25,000 lights. Lord Provost Matthewson performed the opening ceremony; and after it a dinner was given in the Royal British Hotel. At both functions there was a good deal of speaking in a congratulatory vein, which was possibly quite justified; for the station seems to be a thoroughly complete one. There was also a considerable amount of prophecy as to the spread of the new light in the city, and its prospective cheapness, which, to say the least, will make some people look foolish should their anticipations not be realized.

Mr. G. R. Hislop has introduced the eight-hour day at the Paisley Corporation Gas-Works. Under the new system, carbonization is entirely stopped during one shift—from 6 a.m. to 2 p.m.—on Sundays. During this time no wages are being earned or paid; and the saving thus effected goes far to meet the wages of two extra men who are employed to clean the producers. The Gas Corporation have appointed Mr. Charles Manners, who holds other similar appointments in the burgh, to be Gas Analyst.

The Police Commissioners of Dalkeith had this week before them a proposal to adopt the Burghs Gas Supply (Scotland) Act, with a view to the taking over of the undertaking of the local Gas Company. The gentleman who made the proposal stated that the capital of the Company is £8000, and that in 1889 the profits were 30 per cent.; in 1890, 15 per cent.; in 1891, 10 per cent.; and last year, 12½ per cent. The proposal did not, however, find favour; and it was defeated by five votes to four.

The gas-works at Musselburgh are in close proximity to the battery of the Mid-Lothian Artillery Volunteers, and are supposed by the Gas Company to suffer from the concussion caused by the firing of the guns. Some time ago the Company approached the Town Council with a request that, if possible, the battery should be removed. Last Tuesday a letter from the Colonel commanding the Volunteers was read at the Council meeting, in which it was stated that the earth-tremor produced by firing the guns could not carry so far as from the battery to the gasholder. Mr. Mitchell, of the Gas Company, wrote stating that, in their opinion, the concussion was likely to loosen the joints of the holder, and so cause leakage, and that he thought 200 yards would be a safe distance between the holder and the nearest gun. The Council resolved not to take any action in the matter.

A difference has arisen between the Falkirk Gas Company and the Police Commissioners of the burgh with reference to the payment for the public lighting. The Commissioners are owing the Gas Company £415 for the supply of gas during the past quarter; and they decline to pay it because they consider it to be an overcharge. The supply is, as is quite common, by meter; and there are governors upon the burners. The inspector of lighting takes up the extraordinary attitude that more gas is charged for than could have been passed by the governors. In reply to this, the Secretary of the Company has written to the Clerk to the Commission, pointing out that, of 95 lamps which the Gas Manager examined, he found 44 leaking about the fittings, and that the Company are not responsible for the fittings. On the other hand, the inspector of lighting asserts that, during the 14 years he has held his post, the Company have had charge of all the fittings upon the meter lamps. The dispute has, in reality, narrowed itself down to this simple question. But the Commissioners apparently do not see it in that light; for their inspector on Monday night received instructions from them to prepare evidence to enable them to meet a claim by the Company in the Law Courts.

The co-partnery of the Cupar-Fife Gas Company expires in May next; and the Directors have been considering whether or not they should form a new one or a limited liability company. They have resolved on continuing upon the present method, because, during the 60 years the works have been in existence, the Company have been free from serious accident, and have been very successful. Mr. A. MacPherson, of Kirkcaldy, has been appointed to value the property.

There was quite an "informal" meeting of gas managers in the Edinburgh Parliament House last Tuesday, when a number of gentlemen assembled as witnesses in a lawsuit about cannel coal. Mr. J. M'Gilchrist, of Dumbarton, the organizer of the real informal meeting, was one of the number; and the others were Mr. J. Hepworth, of Carlisle; Mr. G. R. Hislop, of Paisley; Mr. J. M'Crae, of Dundee; Mr. G. T. Myers, of Broughty Ferry; and Mr. J. Thomson, of Inverness—Mr. R. Mitchell, of Edinburgh, looking in in the course of the day. The action was at the instance of the New Bank Coal Company, of New Cumnock, and Mr. Hislop, of that town, against Mr. R. Marshall, coal merchant, of Glasgow; and it was brought to recover £325. The statement for the pursuers is that in March, 1891, Mr. Marshall contracted with them for a supply of 3000 tons of the best cannel coal at 14s. 3d. per ton, *plus* 2000 tons on the same terms. Of this quantity 3406 tons 5 cwt. were delivered; but the balance of 1593 tons 15 cwt. had not been received. On account, it is said, of defender's failure to take delivery, pursuers were obliged to sell the coal at 11s. 2d. per ton; and the sum sued for makes up the difference in price, and the charges in connection with the storeage of the coal. Mr. Marshall's statement is that pursuers supplied him with coal of inferior quality, mixed with dirt, common coal, stone, and ironstone, in consequence of which he had complaints from many of his customers, and some of them cancelled their contracts. The coal, the witnesses for the pursuer said, was a soft coal, and was easily affected by outside substances, which might be picked up by being loaded from the bing; and it was small, which might be accounted for by repeated handling. The case for the defender was not reached when the Court rose for the day; and as his Lordship's time was fully occupied for the remainder of the session, it was adjourned till May. The case is creating much interest, because of the frequency of complaints about the quality of cannel.

Much gratification is being felt at the present rise in the price of sulphate of ammonia. In Glasgow last week, the prices realized were £12 7s. 6d. per ton on the spot, and £12 for April, as against £10 5s. at this time last year.

The Profit-Sharing System of the South Metropolitan Gas Company.—On Saturday, the 11th inst., the members of the Profit-Sharing Committee of the employees of the South Metropolitan Gas Company had a supper and smoking concert at the Queen Elizabeth, Asylum Road, Peckham. Mr. J. J. Cooley presided; and among those present were Mr. H. C. Sims, Accountant to the Company, Mr. Burrows, the Chairman of the Workmen's Committee, and delegates from all the stations of the Company. A very pleasant evening was spent; all the speeches delivered testifying to the exceedingly good feeling existing between the Company and their employees. Special stress was laid on the immense advantages which the workmen enjoy under the profit-sharing system, which has made them partners in the prosperity of the undertaking.

The Uses and Abuses of Coal Gas.—This was the title of a paper read at the meeting of the Birmingham and Midland Institute Scientific Society last Wednesday, by Mr. S. R. Barrett. In the course of his eemarks, he said that gas became so familiar, and was so cheaply and readily produced, that consumers in many instances did not confine themselves to a moderate or even reasonable use of it, as compared with the care exercised in the case of other illuminants. The most common cause of extravagance was the use of burners which wasted something like 25 per cent. of the light; and the power of the light was further diminished 20 per cent. by enclosing the flame in a globe. The heat given off by a three-light chandelier was about the same as the heat from a fire in a charcoal brazier, as used on the Continent; and no one, the lecturer continued, would think of using a charcoal brazier in a room without providing ventilation. The only escape for hot and vitiated air from a room was generally the slight space at the top of the door, and the space between the top of the door and the ceiling was filled with stagnant and foul air, which percolated through the ceiling into the rooms above. Mr. Barrett explained how a room could be ventilated by means of tubes, and showed that a light burned much brighter in a clear than in a foul atmosphere.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March* 18.

Sulphate of Ammonia.—Another 10s. per ton advance has been gained; making £12 10s. the present quotation for March delivery—spot parcels continuing extremely scarce. Current prices are, of course, most unwillingly paid by buyers, whether dealers or consumers, as this unexpected rise has completely upset their calculations; and they will be considerably out of pocket by it. Makers themselves, in their wildest hopes as to the future, never dreamt of the figures again reaching the present summit; and even if the improvement has been aided recently by speculators, supply and demand after all rule a market, and there is ample proof that the recent demand has been fully equal to, if not actually in excess of, the production. The shipments corroborate this statement; for they are to date about 5000 tons higher than last year—a fact which will of itself account for the present scarcity without further comment. The quotations for April are somewhat below the present ones; and there are rumours of cheap offers of April—June delivery by the speculators, who seem after all undeterred by the recent movement. Consumers meanwhile are disinclined to operate beyond their immediate requirements. Nitrate, owing to its strong position, is getting dearer again; and 10s. 3d. is quoted to-day.

LONDON, *March* 18.

Tar Products.—Very little new business is being done. Makers of benzol, especially of 50's, expect to see higher prices; but, so far, buyers do not respond to them. If it be true that aniline makers on the Continent have allowed their stocks to run very low, it is not unlikely we may see a sharp advance both in 50's and in 90's benzol, as the season develops and production decreases. A good deal is being made of the large and increasing production of benzol in Germany; but it is believed that the quantities set down by interested market operators are much exaggerated. Distillers find that the quantities of benzol procurable from their tar is yearly diminishing as gas managers find, by skilful carbonizing, it can be sent forward into the gas, increasing its illuminating power, instead of condensing with the tar. Pitch is undoubtedly better; and a strong effort is being made to counteract the action of "bear" selling, which, it is stated, has taken place on an extensive scale. Carbolic and cresylic acids continue to improve. Anthracene is quiet; while common tar oils are practically unsaleable. To-day's values may be taken as follows: Tar, 12s. 6d. Pitch, 26s. Benzols, 90's, 1s. 8d.; 50's, 1s. 5½d. Solvent naphtha, 1s. 2½d. Toluol, 1s. 4½d. Crude benzol naphtha, 30 per cent., 7½d. Creosote, 1d. Creosote salts, 17s. 6d. Carbolic acid, 60's, 2s. 6d.; 75's, 3s.; crystals, 8d. Cresol, 2s. Anthracene, nominal, 30 per cent., "A," 1s. 1½d.; "B," 10d.

Sulphate of Ammonia.—This market continues in a perturbed condition; and buyers make no secret that they cannot procure all their requirements. Stocks are absolutely exhausted; and many users, owing to the difficulty of getting sulphate, will have to use nitrate. The price has sprung from £12 to £12 10s.; and 5s. to 10s. more is asked for forward delivery, all less 3½ per cent. Gas liquor is quoted at 7s. 6d. to 8s. 6d. per ton.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The demand for all descriptions of round coal continues to slacken off; and although in the better qualities there is no actually quotable reduction in list rates, prices are easier—buyers who are in a position to take anything like quantities being in many cases able to obtain some substantial concession. At the pit mouth, best Wigan Arley only in very exceptional cases averages more than 12s.; Pemberton four-feet and second qualities of Arley, 10s.; and common house-fire coals, about 8s. per ton. Common round coals become, if anything, still more difficult to dispose of; and where sales of any weight are involved, prices are so much a matter of special bargain that quoted list rates are altogether nominal. Where business of any moment is put through, very low prices are being taken—6s. 6d. to 7s. representing about the average figures for ordinary qualities of steam and forge coal. The shipping demand is also extremely quiet; and sellers in many cases are open to entertain almost any offers that are made—8s. to 8s. 3d. representing the full average figures obtainable for ordinary descriptions of steam coal, delivered at the ports on the Mersey. Prices for all classes of engine fuel are fairly steady at fully late rates. Burgy fetches 6s. to 6s. 6d.; medium qualities of slack, 3s. 6d. to 4s.; better qualities, 4s. 6d. to 5s.; and some of the special sorts, 5s. 3d. to 5s. 6d. per ton, at the pit.

Northern Coal Trade.—There has been rather a fuller demand for coal in the North-eastern district; but many of the collieries have not orders to employ them full time. Best Northumberland steam coal is still quoted at 8s. 6d. per ton f.o.b.; and the best collieries have now a fair number of orders, though trade is inadequate for those of a secondary kind. Small steam coals are rather easier; and the price that is generally asked is now 3s. 3d. per ton. Manufacturing coals are quiet; but the demand is slightly better than it has been. In gas coals, there is now a diminished home consumption; but there is the partial counterbalance of rather larger exports. Some additional contracts have been concluded, and others are practically settled; but prices have ruled low. One of those that is usually most keenly competed for is believed to have been decided at a price which, with a due allowance for freight, would leave something like 5s. 9d. to 5s. 10½d. per ton as the price of the coal on board. Odd cargoes of gas coal seem to be sold at prices that range from 6s. 3d. to 6s. 6d., however; and one colliery asks 1s. per ton above the latter figure. There is but little alteration in the price of household coal. Coke is quiet; and best Durham kinds barely command 14s. per ton. Gas coke is unaltered; but there appear to be rather larger shipments from the Tyne in the last week or so, and there is also a fuller consumption at some of the cement works.

Scotch Coal Trade.—Owing to the opening of the Continental trade, there is more activity on the eastern side of Scotland; but prices do not improve. In fact, for main sorts they still tend to decline. It is said that, in order, if possible, to stem the drift of orders to the North of England, contracts for delivery over the season have been entered into at current rates. Generally, however, there is an indisposition to accept such terms; because, should freights rise, the small profits left would be swept away. Half time, and four days a week, are all that is being worked in nearly every district; and one effect of the small output is that dross and nuts are getting scarce and are rising in price. There is a fair amount of inquiry for splint coal for gas-works. The prices, f.o.b. Glasgow, which are current, are: Main, 6s. 3d. to 6s. 6d.; ell, 7s. to 7s. 3d.; splint, 6s. 6d. to 6s. 9d.; and steam, 8s. to 8s. 3d. per ton. The shipments for the past week amounted to 99,993 tons—a decrease upon the preceding week of 946 tons, and upon the corresponding week of last year, of 26,907 tons. For the year to date, the total shipments have been 969,281 tons—a decrease of 112,363 tons upon the same period of last year.

Harrow District Gas Company.—The report to be presented to the shareholders of this Company at their half-yearly meeting next Monday states that the balance on the profit and loss account is £2010. Out of this sum the Directors recommend that £250 should be written off the preliminary expenses account, and dividends declared at the rates of 7½, 7, and 5½ per cent. per annum on the "A," "B," and "C" stocks, all less income-tax. The Directors have for some time been in negotiation with the Directors of the Great Stanmore Gas Company, with a view to the fusion of the two undertakings. An agreement has now been arrived at; and a Bill is to be promoted to give effect thereto.

Sales of Shares.—The following sales of shares in the *Rochester, Chatham, and Strood Gas Company* have just taken place: Six £50 shares, at £114 each; 28 £12 10s. shares, at £21 10s. each; 28 £3 6s. 8d. shares, at £5 5s. each; eight £8 10s. shares, at £20 each.——Fifteen £20 shares in the *Gravesend and Milton Gas Company* have changed hands at £32 10s. each.——Thirty £5 shares in the *Chatham, Brompton, &c., Water Company* have been sold for £15 7s. 6d. each; seven more realizing £15 5s. each.——Among a number of other shares sold by auction at Yeadon yesterday week were two lots of consolidated stock in the *Yeadon Water Company*—the first being of the nominal amount of £187 0s. 6d., and the second £100. The former realized £250 11s. 6d.; and the latter, £135.

Electric Lighting for Accrington.—Last Wednesday week, Mr. R. Walton, one of the Local Government Board Inspectors, held an inquiry at Accrington, into an application by the Corporation for power to borrow, among sums for other purposes, £10,000 for carrying out an electric light installation. In support, the Town Clerk stated that the local Gas Company supplied the town at a very dear rate, although they were right in the heart of the Lancashire coal-field. The price was 3s. 6d. per 1000 cubic feet, subject to a small discount. This was far too high; and therefore they ought to have the electric light, though it was not expected that it would be as cheap as gas. It was not intended at present to light the streets generally with the electric light, but to confine it to a private supply. There was no opposition.

Sheppy Gas Company.—The annual general meeting of this Company was held last Wednesday, when the report of the Directors, of which an abstract appeared in the JOURNAL last week, was read by the Secretary, Mr. A. W. Marks. In moving its adoption, the Chairman (Mr. C. B. Shrubsole) referred to the part announcing the reduction in the price of gas to 3s. per 1000 cubic feet as from the end of the present month. He called the shareholders' attention to the fact that, of the 26 gas companies in Kent, only three are supplying gas at a lower figure than this; and the smallest of them, he said, was doing three times the trade of the Sheppy Company. He next referred to the draft of the Provisional Order for the acquisition of the Sheerness Pier by the Local Board of Health, and said that the original clauses made the Company liable for tolls to the extent of £200 per annum on cargoes loaded and unloaded at their wharf. They were therefore compelled to give notice of objection to the Order; but he was glad to say that the Local Board had assented to most of their propositions, and he was hopeful of a satisfactory arrangement being arrived at respecting the few points of difference still existing. The report was adopted; and the dividends recommended therein were declared. Votes of thanks were accorded to the Secretary, and to the Manager (Mr. W. T. Carpenter), for the efficient manner in which they had discharged their duties; also to the Directors, for their excellent management of the Company. Since the meeting, all the objections raised in respect of the Pier Provisional Order have, we learn, been satisfactorily met by the Clerk to the Local Board.

The Parana Water-Works Bondholders.—A meeting of the holders of the City of Parana Water-Works 5 per cent. mortgage bonds was held a short time since, under the presidency of Mr. J. Morris, to consider whether they would or would not accept an *ad referendum* agreement which had been made by their representative with the Governor of the Province of Entre Rios with reference to the funding of the overdue coupons, and a further coupon which would become due on July 1 next. At the present time the arrears consisted of one coupon in 1891, two in 1892, and another which had just fallen due. These four coupons, together with one other due on July 1 next, would bring the total up to five. The principal conditions of the agreement were as follows: (1) That the funding bonds required for payment of interest on the water-works issue under the present arrangement should be deposited with the River Plate Trust, Loan, and Agency Company, Limited, before March 31 next, and should carry interest from January, 1893, in the case of those delivered in payment of the four coupons now overdue, and in the case of those delivered in payment of the water-works coupon due July 1, 1893, as from that date; (2) that interest on the water-works bonds should be resumed in full, commencing with the coupon payable on Jan. 1, 1894; (3) that the sinking fund of the water-works bonds should be suspended until the last day of the year 1895. He thought the suspension of the sinking fund one of those easy modes of temporary relief that could be always properly resorted to in cases like the present. He moved the approval of the agreement; and the motion was seconded and carried unanimously.

The Electric Lighting Undertaking of the Brighton Corporation.—The *agenda* at last Thursday's meeting of the Brighton Town Council contained the accounts of the Corporation electric light undertaking for the year ended Dec. 31, 1892. The revenue account shows a total expenditure of £2457; the expenditure on generation being £1643. The income is £4687, divided as follows: Electricity sales, £4543; meter-rents, £139; and work executed for customers, £5. Of the £2233 gross profit, £2221 is transferred to the net revenue account, and £12 is carried forward. The expenditure on this account is £1238 interest, and £983 is placed to the sinking fund.

Defalcations in the Stratford-on-Avon Corporation Gas Department.—At the meeting of the Stratford-on-Avon Town Council last Tuesday, the Gas Committee reported at length on some recently-discovered defalcations on the part of one of their servants named Hirons. The Gas Manager (Mr. J. S. Cranmer) had reported to the Committee that the examination of the accounts from Sept. 30, 1890, to Sept. 30, 1892, disclosed defalcations amounting to upwards of £200; and the examination was being continued. In response to the Committee's request, the Auditor (Mr. F. L. Thompson) had attended before them, and explained that the reason Hirons's defalcations had not been detected was that the meter-index book, being unofficial and not a prescribed book, was not audited by him or compared with the ledger. He, however, pointed out, as a preventive of any further irregularities, that the book should be converted into a "meter-index and value book." The Committee were satisfied that the accounts had been properly audited. It was agreed not to discuss the subject until after Hirons's trial.

Electric Lighting Scheme for Hertford.—Reference has already been made in the JOURNAL to the electric lighting predilections of the Hertford Town Council, as set forth in a pamphlet issued by the Lighting Committee. These are now taking definite shape; for, at the meeting of the Council on the 9th inst., a report by the Committee, recommending the adoption of a scheme based on the alternate-current system, with transformer sub-stations (the dynamos to be driven by gas-engines burning Dowson gas), at an estimated outlay of £5800, and an annual cost, inclusive of sinking fund charges, of £983, was under consideration. It was assumed that the total consumption for private lighting would be 45,000 units per annum; and for the public lamps, 15,000 units. The annual income from the two sources was put at £1312; but if only two-thirds of the number of units above given were taken, the receipts would, it was stated, about balance the expenses, including interest and depreciation. The cost of the meters was not included; but it was thought that the rental from these would make up for the extra annual expenditure. The Committee acknowledged their indebtedness to Mr. J. A. M'Mullen for much assistance in the preparation of their report; and they concluded by recommending the Corporation to embark upon the undertaking. This report was considered by the Lighting Committee, who sent it up to the Council accompanied by the suggestion that the opinion of a consulting electrical engineer should be obtained upon the scheme. This course was agreed to.

The Water Purification Question at Worcester.—At the last two meetings of the Worcester City Council, there have been prolonged debates on the vexed question of the purification of the water supply. An experiment has been made with plant furnished by the Revolving Purifier Company, who, early this year, offered a further trial of the process, if the Council, at their expense, employed an independent expert of high standing, approved by both parties, to decide whether the purification of the water was satisfactory, and, if so, that the contract for the purchase of the plant for £3734 should be completed. This the Water and Sewerage Committee would not accept; and they proceeded to make inquiries as to the merits of polarite—this resulting in a proposal being made at the meeting of the Council, on the 7th ult., that arrangements should be made, with the International Water and Sewerage Purification Company, for a polarite chamber, at an estimated cost of £1500. The discussion was adjourned to the meeting held on the 7th inst., when the Mayor (the Hon. Percy Allsopp, M.P.) moved an amendment, objecting to the expenditure of further money until the effect had been seen of extending the filtering area, which work has already been sanctioned by the Council. A memorial in favour of the adoption of polarite, signed by 670 inhabitants, was presented; and some particulars were given by Alderman E. Day, as to the results of its working at Reading, Hastings, and Worth Park. However, on a vote being taken, 25 members declared in favour of the amendment, and 13 against; and, on being put as a substantive motion, it was carried.

Exhibitions of Gas Appliances.—Under the auspices of the Local Board, an exhibition of Messrs. C. Wilson and Sons' gas cooking and heating stoves was held at Cleckheaton last week. The formal opening of the exhibition was performed by Mr. B. H. Goldthorp, who, in the course of his remarks, stated that the interest of the town in the gas undertaking was represented by a total outlay of £53,000 (less £14,000 repaid through the sinking fund). In connection with the exhibition, a series of lessons in cookery were given by Miss Smith, of the Yorkshire School of Cookery.——Messrs. Fletcher, Russell, and Co., Limited, exhibited a large variety of their improved gas appliances at Devonport last week. Cookery demonstrations were given by Miss Helen Edden, of the South Kensington School of Cookery; and these were well attended.——The exhibition of gas appliances by Messrs. Richmond and Co., Limited, of Warrington and London, which, as already recorded by our Scotch Correspondent, was opened in Edinburgh on the 27th ult., was brought to a successfnl close on the 11th inst. The audiences at Miss Owen's cookery demonstrations were large and appreciative; and the ladies presented her with a half-hunter gold watch, and a beautifully-bound volume of views of Edinburgh, as an acknowledgment of her professional and personal courtesy. In connection with this exhibition, it may be mentioned that the Edinburgh Gas Commissioners have decided to purchase Messrs. Richmond and Co.'s stoves for letting out on hire. The firm have lately held a successful exhibition of their appliances at Lytham, in conjunction with the Gas Committee of the Lytham Improvement Commissioners, by whose Chairman (Mr. J. Pearson) it was opened. Cookery lectures were given twice each day by Miss Leng, of South Kensington; and they were well attended.

Committal for Non-Payment of Water-Rates.—In the City of London Court last Friday, before Mr. Commissioner Kerr, the case of *The East London Water-Works Company v. Norman* was heard. The Company sought to have the defendant (Mr. F. Norman, of 185, North End Road, Walham Green) committed to Holloway Gaol for non-payment of £3 13s. 6d. due for water supplied to houses of which he had collected the rents. Mr. George Kebbell, the Company's Solicitor, said that under Mr. Forrest Fulton's Act the Company could not cut off the supply of water to houses, although the rates were unpaid, if the rateable value were below £20 per annum; but they had proceeded against the defendant as the collector of the rents of the houses. They put in an execution, and then found that the defendant's wife was the owner of the houses as well as of the goods seized. They had to withdraw, and defray all costs; and yet the defendant had not paid the rates due. Defendant said he had not collected the rents since Jan. 23. His wife did not allow him to collect them now. Mr. Kebbell said it was very anomalous that they could not cut off the water or get their rates. The Commissioner said the defendant should have paid the rates. He made an order, committing him to prison for ten days for non-payment of the amount due; but he suspended its operation for a week, to allow of the money being paid. Defendant said he could not pay; and he should have to go to prison.

The Bodmin Town Council and the Water-Works.—A deputation from the Bodmin Corporation waited upon the Directors of the Local Water Company yesterday week, to lay before them a resolution which had been passed by the Council, asking the Company to insert the following clause in their Bill now before Parliament: "That, in the event of the Company disposing of their property, the same be first offered to the Bodmin Urban Sanitary Authority for their acceptance or refusal, on terms to be settled by arbitration." Speaking on behalf of the deputation, Mr. Roscorla said the Council desired to pay every respect to the rights of property; and they claimed that the resolution was free from coercion, and did not touch the Company's prerogative of proprietorship. The inhabitants were indebted to the Company for what had been done in the past; and they had voluntarily met the proprietors in a spirit of reciprocity, and brought to the undertaking greater results than were anticipated by the promoters. The proposed clause, he added, might not be taken advantage of for some years; but future generations would see that the Authority endeavoured to retrieve the error made thirty years ago in refusing to provide a water supply. The Chairman of the Directors (Mr. Cardell), in reply, said there had been no meeting of the Board, and therefore he could not speak on their behalf. It was a mistake to regard the Directors as having sole control. They represented 800 shares, 239 of which were held by residents, and 561 by non-residents. Out of the last number, he considered the holders of 166 shares had other interests in the town; but the holders of the remaining 395 were indifferent. The Directors had, therefore, to guard their interests. They had no instructions from the shareholders as to the present or future disposal of the works, and nothing could be done without consulting them. He thought it was expecting too much for the Directors to legislate now for thirty years hence; and he did not believe the shareholders would entertain the part of the clause referring to arbitration. He promised that the Directors would send a written reply to the Council.

The Sheffield Town Council and the Legal Adviser of the Late Water Company.—At the last meeting of the Sheffield City Council, the Town Clerk, in accordance with instructions which he received at the previous meeting (see *ante*, p. 285), presented a detailed report on the subject of the question at issue between the Water Committee and Mr. Broomhead-Colton-Fox, referred to in the resolution of the Water Committee of Feb. 1, wherein they proposed to pay him £1000 in full settlement of all matters in dispute. He stated that, when the Corporation took over the undertaking of the late Water Company on Jan. 1, 1888, there was in one of the books of the Company a credit to Mr. Fox, entitled "Law expenses, estimated £18,514 15s. 10d." On the other side, there appeared a number of payments to him amounting to £18,636 7s. 4d. This state of affairs was not brought to the notice of the Committee for a considerable time. But when it was, they were not satisfied to take the item of law expenses merely as an estimate; and it occurred to them that they were entitled to a proper account of the mode in which Mr. Fox discharged himself of the large sum of £18,636 7s. 4d. After adverting to the circumstances in great detail, the Town Clerk said he had submitted the facts to Mr. Levett, Q.C., who advised him that, if Mr. Fox's bills and accounts were delivered before Jan. 1, 1888, it would be too late to tax them now, and an action by the Corporation for an account would fail; but that, if the bills were delivered after that date, he thought the proposed action would be likely to succeed. When, after that, he applied to Mr. Fox, he refused to render the account. That gentleman's partner suggested, with a view of getting out of the deadlock, that he was willing to submit his bills for professional services—about £7000 of the £18,600—to the judgment of the President of the Incorporated Law Society, who should say whether he ought to do anything more. This would not have been altogether satisfactory; but meanwhile the Water Committee were divided on the matter, and no conclusions were come to. Attention was also called in the report to the abstract of accounts which Mr. Fox had sent in. With the light thrown upon the case by this abstract, he had since advised the Corporation not to enter upon litigation, which would be both lengthy and costly. Alderman Clegg now proposed that the Town Clerk be instructed to inform Mr. Fox that the Council were willing to admit his claim for professional services since the agreement for the purchase of the water-works at £1000; that they must insist upon having the particulars of his claim discharging himself from the amount standing to his debit in the Company's books; that the President of the Incorporated Law Society should decide the amount in case of dispute; and that, if Mr. Fox declined this proposition, he be informed that the Council were willing to state a case for the opinion of the High Court of Justice as to whether or not he is bound to render an account. The discussion which ensued indicated that there was an equal division of opinion among the members on the subject; and the result of the voting showed 27 in favour of the resolution, and 26 against. It was therefore adopted.

The Purchase of the Ilkley Gas-Works by the Local Board.—In our "Parliamentary Intelligence" to-day will be found the report of the proceedings before the Committee of the House of Lords on the Bill promoted last session by the Ilkley Local Board to enable them, *inter alia*, to purchase the undertaking of the Ilkley Gas Company. It will be seen that the result was the conclusion of a provisional agreement between the parties. This document came before a special meeting of the Board last Wednesday; and, upon the advice of the Consulting Engineers (Messrs. Newbigging and Gott), it was confirmed—all the members except three voting for it. The Board take over the works as from Jan. 1 last, as per the Company's balance-sheet on Dec. 31, 1892, subject as follows: The Board pay £55,000 and 3½ per cent. per annum interest thereon from Jan. 1, 1893, until the completion of the purchase. The Company retain the insurance fund, £755, and the reserve fund, £4894 1s. 4d.; and they may keep their investments as representing £4672 11s. 4d. on account. They may also retain the balance of net profit carried forward on Dec. 31, 1892—viz., £5104 16s. 4d. The Company are to receive all debts and pay all liabilities (including dividend) to that date, and to hand over the concern as from then. The Company pay their own parliamentary expenses, and their loan debts of £2500. The Board pay all debts and liabilities incurred by the Company since Jan. 1, 1893, stated to be ordinary trade liabilities, and receive all earnings from that date, and take over the benefit and burden of all existing contracts. The Company retain such books as may be required to wind up the concern, and keep possession until completion, and carry on the works in the usual way at the risk of the Board. The completion of the purchase is to take place on Aug. 1, 1893. Any question arising in carrying out these terms is to be settled by an arbitrator.

Brussels Water Supply.—In an article which appeared in the JOURNAL early last year, reference was made to several projects on foot for improving the water supply of Brussels. We learn from the *Engineer* that a new scheme has been prepared by M. Putzeys, the City Engineer, and that it has just been laid before the Municipal Council. Its most remarkable feature, says our contemporary, is probably the proposition that the supply of water for domestic consumption should be kept distinct from that required for industrial purposes. According to the project, the water would be obtainable from the non-navigable channel of the Meuse, about a mile and a quarter above Namur. Here a circular iron well provided with regulators, so as to deal with the fluctuations in the level of the river, would be sunk in the stream, and would have a capacity of 130,000 cubic metres (about 30 million gallons) of water daily. The well would be connected to a double steel column communicating with an aqueduct leading to the elevating works. The aqueduct will, for a length of nearly two miles, be dug out of solid rock, at a depth of 14½ feet lower than the level of the river. The elevating works will comprise the preliminary water basins and the filters; and the water, after being filtered, will be pumped through mains 28 inches in diameter into an aqueduct leading to the projected distributing reservoir in the Bois de la Cambre, in Brussels. The total length of the aqueduct is about 41 miles. The capacity of this new reservoir will be 31,000 cubic metres, or a trifle more than the present daily consumption in the city. The scheme has been worked out for the supply to Brussels of from 29,000 to 87,000 cubic metres of water per day. If the project drawn up is adopted by the Municipality, the city would have a double water service. The first—that now existing—yields daily from 30,000 to 35,000 cubic metres of potable water; and the second would furnish, as already mentioned, from 29,000 to 87,000 cubic metres daily for industrial purposes, and would flow in a separate set of mains. It is estimated, in the report of the Engineer, that the quantity of water which would be available by the carrying out of the scheme would, after taking into consideration the constantly increasing population, suffice for all possible requirements during the next 40 years.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For Stock Market Intelligence, see ante, p. 498.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	14 Oct.	10½	Alliance & Dublin 10 p. c.	10	17½—18½	..	5 13 6
100,000	10	"	7½	Do. 7 p. c.	10	12—13	..	5 15 5
300,000	100	3 Jan.	5	Australian (Sydney) 5 % Deb.	100	104—106	..	4 14 2
100,000	20	30 Nov.	8	Bahia, Limited	20	11—12	..	13 6 8
200,000	5	16 Nov.	7½	Bombay, Limited	5	5¾—6½	..	6 0 0
40,000	5	"	7½	Do. New	4	4—4½	..	6 13 4
380,000	Stck.	24 Feb.	11½	Brentford Consolidated	100	214—218	..	5 5 6
180,000	"	"	8½	Do. New	100	168—173	..	4 18 3
220,000	20	15 Mar.	11½	Brighton & Hove Original	20	41—43†	..	5 6 11
888,500	Stck.	31 Aug.	5	Bristol	100	103—106	..	4 14 4
320,000	20	29 Sep	11½	British	20	42—44	..	5 2 3
50,000	10	15 Mar.	11½	Bromley, Ordinary 10 p. c.	10	19—20*	+1	5 15 0
51,510	10	"	8½	Do. 7 p. c.	10	14½—15½*	+¾	5 9 8
328,750	10	—	—	Buenos Ayres (New) Limited	10	6—7	..	—
200,000	100	3 Jan.	6	Do. 6 p. c. Deb.	100	98—100	..	6 0 0
150,000	20	24 Feb.	8	Cagliari, Limited	20	24—26	..	6 3 1
550,000	Stck.	14 Oct.	12½†	Commercial, Old Stock	100	245—250	..	5 0 0
165,000	"	"	9½†	Do. New do.	100	187—192	..	4 18 11
160,762	"	15 Dec.	4½	Do. 4½ p. c. Deb. do.	100	125—130	..	3 9 3
800,000	Stck.	15 Dec.	13	Continental Union, Limited	100	227—232	..	5 12 0
200,000	"	"	10	Do. 7 p. c. Pref.	100	190—195	..	5 2 7
75,000	Stck.	15 Mar.	10	Crystal Palace District	100	187—192*	+2	5 4 2
486,090	10	27 Jan.	10	European, Limited	10	21—22	..	4 10 11
354,060	10	"	10	Do. Partly paid	7½	14½—15½	..	4 17 0
5,596,560	Stck.	10 Feb.	12	Gaslight & Coke, A, Ordinary	100	222—247	..	5 5 8
100,000	"	"	4	Do. B, 4 p. c. max.	100	93—96	..	4 3 4
665,000	"	"	10	Do. C, D, & E, 10 p.c. Pf.	100	260—265	..	3 15 6
30,000	"	"	5	Do. F, 5 p. c. Prf.	100	115—120	..	4 3 4
60,000	"	"	7½	Do. G, 7½ p. c. do.	100	165—170	..	4 8 2
1,300,000	"	"	7	Do. H, 7 p. c. max	100	166—170	..	4 2 4
463,000	"	"	10	Do. J, 10 p. c. Prf.	100	260—265	..	3 15 6
476,000	"	"	6	Do. K, 6 p. c. Prf.	100	154—158	..	3 16 0
1,061,150	"	15 Dec.	4	Do. 4 p. c. Deb. Stk.	100	123—126	..	3 3 6
294,850	"	"	4½	Do. 4½ p. c. do.	100	127—132	..	3 8 2
908,000	"	"	6	Do. 6 p. c. do	100	165—170	..	3 10 4
3,800,000	Stck.	16 Nov.	12	Imperial Continental	100	227—230	..	5 4 0
75,000	5	30 Nov.	6	Malta & Mediterranean, Ltd.	5	4¾—5	..	6 0 0
560,000	100	1 Oct.	5	Met. of Melbourne, 5p. c. Deb.	100	107—109	..	4 11 9
541,920	20	16 Nov.	5	Monte Video, Limited	20	13¾—14¾	..	6 18 0
150,000	5	30 Nov.	10	Oriental, Limited	5	7¾—8¼	..	6 1 2
60,000	5	29 Sept.	7	Ottoman, Limited	5	4—4½	..	7 7 4
166,870	10	—	2	Pará Limited	10	2—2½	..	—
				People's Gas of Chicago—				
420,000	100	2 Nov.	6	1st Mtg. Bds.	100	103—107	..	5 12 1
500,000	100	1 Dec.	6	2nd Do.	100	100-105	..	5 14 3
150,000	10	—	10	San Paulo, Limited	10	9—10	..	—
500,000	Stck.	24 Feb.	15½	South Metropolitan, A Stock	100	290—295	..	5 5 0
1,350,000	"	"	12	Do. B do.	100	238—243	−2	4 18 9
230,000	"	"	13	Do. C do.	100	245—250	..	5 4 0
750,000	"	13 Jan.	5	Do. 5 p. c. Deb. Stk.	100	144—147	+1	3 8 0
60,000	Stck.	15 Mar.	11½	Tottenham & Edm'nton, "A"	100	225—230*	..	5 0 0
				WATER COMPANIES.				
744,897	Stck.	30 Dec.	10	Chelsea, Ordinary	100	260—265	+2	3 15 6
1,720,252	Stck.	14 Oct.	8	East London, Ordinary	100	214—218	..	3 13 5
544,440	"	30 Dec.	4½	Do. 4½ p. c. Deb. Stk.	100	141—144	..	3 2 6
700,000	50	15 Dec.	8½	Grand Junction	50	109—112	..	3 15 10
708,000	Stck.	10 Feb.	11	Kent	100	277—282	..	3 18 0
1,043,800	100	30 Dec.	9½	Lambeth, 10 p. c. max.	100	235—240	..	3 19 2
406,200	100	"	7½	Do. 7½ p. c. max.	100	195—200	..	3 15 0
285,000	Stck.	29 Sept.	4	Do. 4 p. c. Deb. Stk.	100	127—132	..	3 0 7
500,000	100	10 Feb.	12½	New River, New Shares	100	323—326	..	3 14 0
1,000,000	Stck.	27 Jan.	4	Do. 4 p. c. Deb. Stk	100	133—137	..	2 18 5
902,300	Stck.	15 Dec.	6½	S'thwk & V'xhall, 10p. c. max.	100	162—167	+1	3 17 10
126,500	100	"	6½	Do. D 7½ p. c. do.	100	145—150	..	4 6 8
1,155,066	Stck.	15 Dec.	10	West Middlesex	100	260—265	..	3 15 6

*Ex Div.

† Next dividend will be at this rate.

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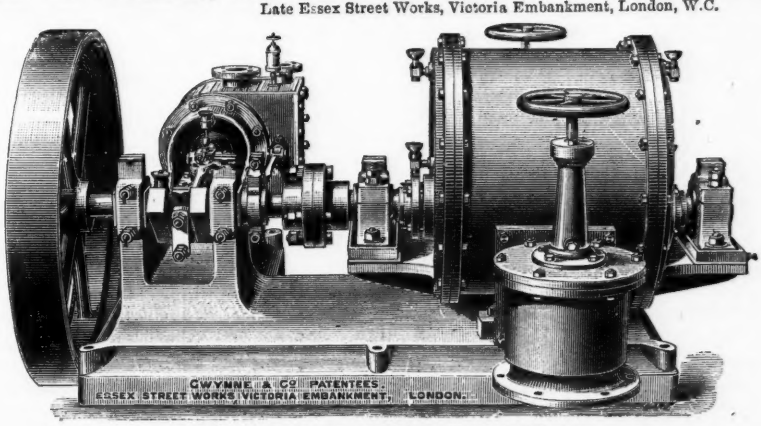

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Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, STEAM-PUMPS for Tar, Liquor, or Water; PATENT SELF SEALING AND CLEANSING RETORT-LIDS AND MOUTHPIECES; CENTRIFUGAL PUMPS and PUMPING ENGINES specially adapted for Water-Works raising Sewage, &c.

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NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

ANDREW STEPHENSON, Agent.
Please address all communications to the Company, as above.

ANDREW STEPHENSON, Agent for BRIN'S OXYGEN COMPANY, Limited, Westminster, S.W.
City Address: 182, Gresham House, Old Broad Street, LONDON, E.C.

VOLCANIC Fire Cement (Winkelmann's)
Fire Resistance 4500° Fahr.
ANDREW STEPHENSON, Sole Agent, 182, Gresham House, Old Broad Street, LONDON, E.C.

CANNEL COAL, ETC.

JOHN ROMANS & SON, EDINBURGH.
Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, } SCOTLAND.
NEWTON GRANGE, NEAR DALKEITH, }

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors, for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings, at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER, LINCOLN."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

THE Advertiser, having had considerable experience in the construction of Gas-Tanks, would be glad of EMPLOYMENT. Could assist Engineer in preparing Drawings, Specifications, and Quantities.
Address W. C., 4, Barbot Street, Hyde Lane, EDMONTON.

WANTED, by a Gas-Fitter, a Situation. Used to Meter and Heating and Cooking Stove Fixing, can read Meters, and do General Repairs on Works; also Main and Service laying. Age 27; married.
Address No. 2208, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a practical Man, a Situation as GAS-FITTER, MAIN and SERVICE LAYER. Would take Management of Small Gas-Works. Has had five years' experience in Electric Lighting. Can do wiring, and all repairs necessary. No objection to going abroad. Good reference.
Address No. 2210, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

DRAUGHTSMAN wanted, well versed in Details and Quantities, by Gas Engineers and Contractors in the North of England.
Apply, by letter, stating age, terms, and experience, to No. 2213, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

COUNTY BOROUGH OF WIGAN.
(GAS DEPARTMENT.)

A METER Inspector required. Applications to be made by letter, giving age and references, to the undersigned.
JOS. TIMMINS, Engineer.
Borough Gas-Works, Wigan,
March 8, 1893.

DUNFERMLINE GASLIGHT COMPANY, LIMITED.

THE Directors of this Company desire the services of a competent person to act as MANAGER and TREASURER of the Company's Works and Business, to devote his whole time to his duties.
Applicants must have had experience in construction and erection of Apparatus, and complete knowledge of the most modern methods of Carbonization, and Gas Purification and Distribution. The present annual make of Gas is about 70 million cubic feet.
Applications, stating age and experience, and accompanied with testimonials, to be addressed to the Chairman, at the Works, on or before the 10th of April next; the person appointed to be prepared to enter on his duties on the 1st of June next.
Gas-Works, Dunfermline,
March, 1893.

JAMES LAWRIE & CO. supply Best SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.
Postal Address: 1, WHITTINGTON AVENUE, E.C.
Telegram Address: "EIRWAL LONDON."

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. IV., centre of JOURNAL.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock, Oldham."

JUNIOR Draughtsman wanted in a Gas Engineers and Contractor's Office.
Apply, by letter, with references and qualifications, and stating salary required, to No. 2200, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a competent Working Foreman, for the Harlow and Sawbridgeworth Gas-Works. Must be a good Carbonizer and Fitter, and have held a similar position. State age. Wages, 30s. (House, rent free).
Applications, endorsed "Foreman," with references, to be sent on or before Thursday, April 6, 1893, to
EDMUND F. PARKER, Secretary.

WANTED, New or Second-hand, Two PURIFIERS, 20 ft. long, 10 ft. wide, 5 ft. deep, with planed joints, two Tiers of Wood Sieves, and Lifting Apparatus complete.
State price and particulars, to Mr. J. W. PORTASS, Manager, Gas-Works, BISHOP'S STORTFORD.

EXHAUSTER FOR SALE.

ONE of Waller's Three-Blade Rotary EXHAUSTERS of 10,000 cubic feet per hour. Can be seen at work; being replaced by a larger one.
For further particulars, apply to Mr. COOPER, Gas-Works, Banbury, OXON.

SCRUBBER for Sale, 6 feet diameter, with Spiral Staircase, Gallery, House, Connections, &c., complete, made by Messrs. C. & W. Walker. In good condition.
Apply, by letter, to No. 2211, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—A perfectly new 20,000 cubic feet per hour EXHAUSTER, with Steam-Engine combined, including Hydraulic Gas Governor, Bye-Pass Valves, and Connections.
For further particulars, apply to Mr. T. G. MARSH, 41, Corporation Street, MANCHESTER.

TAR.

FOR SALE—Ten tons of good Tar, delivered at Moortown Station, on the Manchester, Sheffield, and Lincolnshire Railway (Lincoln and Grimsby Branch).
Offers to be sent to F. B. COUSANS, Secretary, Gas Company, CAISTOR.

RUGBY GAS COMPANY.

FOR SALE—One 10-inch and one 12-inch STATION GOVERNOR (shortly to be removed to make room for extensions).
Both Governors may be seen at work on application to the undersigned, to whom all inquiries are to be directed.
By order,
C. MEIKLEJOHN, Manager.
March 18, 1893.

FOR SALE, the following second-hand GAS PLANT:—
GASHOLDER, 35 ft. by 14 ft.
" and Cast-Iron TANK, 30 ft. by 17 ft.
Four PURIFIERS, 12 ft. square by 4 ft. 6 in. deep.
Cast-Iron SCRUBBER, 36 ft. high by 10 ft. diameter.
CONDENSERS to pass 500,000 cubic feet per diem.
EXHAUSTER to pass 20,000 cubic feet per hour.
Also various other sizes of above or any Gas Plant. Inquiries invited.
Apply to SAML. WHILE, 60, QUEEN VICTORIA ST., E.C.

THE Ballymena and Harryville Gaslight Company, Limited, invite TENDERS for from 1500 to 1700 tons of Best Screened GAS COAL, free on Waggons at Larne Harbour, to be delivered before the 1st of November next.
Payment to be made on the first Monday in March, 1894.
Tenders to be lodged with me on or before Monday, the 27th of March.
T. C. C. HOOD, Secretary.
Ballymena, March 9, 1893.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application.
OXIDE PAINT, SULPHURIC ACID, & Chemicals.
120 and 121, NEWGATE STREET, LONDON, E.C.

OXIDE OF IRON.

FINEST Quality of Natural Bog Ore.
Particulars and price, apply to Mr. T. L. ARCHER, 20, Fennel Street, MANCHESTER.

MESSRS. DEBENHAM, TEWSON, FARMER, and BRIDGEWATER'S MONTHLY LIST of Shops, Show-Rooms, Factories, and Waterside Premises, suitable for the Exhibition and Manufacture of Engineering and other Appliances, may be obtained, free of charge, at their Offices, 80, CHEAPSIDE, E.C.

LIQUOR and Tar wanted.
BROTHERTON AND CO., Ammonia and Tar Distillers, LEEDS and WAKEFIELD.

SADLER AND CO., LIMITED, MIDDLESBROUGH; ULVERSTON (BARROW); PORTSMOUTH; CARLTON; STOCKTON; 315, St. Vincent Street, GLASGOW; 10, Marsden Street, MANCHESTER; and 85, Water Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office: MIDDLESBROUGH. Correspondence invited.

MR. J. C. CHAPMAN, Fellow of the Chartered Institute of Patent Agents, advises on all matters connected with LETTERS PATENT FOR INVENTIONS and the PROTECTION OF TRADE MARKS, &c., at home and abroad. Preliminary Information and Handbook on application.
70, Chancery Lane, LONDON, W.C.

LAUNDRY Lectures and Demonstrations of Gas Appliances arranged with Gas Companies and Technical Education Committees. These are suited to work in with Cookery Lectures.
For dates and terms, apply to Mrs. HELEN BURDETT, Laundry Instructress, 30, Gladstone Avenue, WOOD GREEN, N.

PATENTS: Some Popular Delusions.
By W. LLOYD WISE, Esq., J.P., C.C., Fellow of the Chartered Institute of Patent Agents, London. See CALVERT'S MECHANIC'S ALMANAC for 1893. Price 4d.
MANCHESTER: JOHN HEYWOOD, Deansgate; and JOHN CALVERT, 99, Great Jackson Street. LONDON: JOHN HEYWOOD, 2, Amen Corner.

TENDERS FOR GAS COAL.

THE Gas Committee of Limerick invite TENDERS for the usual quantity of GAS COALS.
For further particulars, apply to the MANAGER, Gas Offices, 34, William Street, LIMERICK.

BOROUGH OF WIDNES.

TO IRONFOUNDERS.

THE Widnes Corporation are prepared to receive TENDERS for the following CAST-IRON PIPES:—
25 tons of 12-inch Spigot and Socket Gas-Mains.
50 " 9 " " " " " "
50 " 3 " " " " Water-Mains.
Copies of Specifications and Conditions of Contract may be obtained on application to Mr. Isaac Carr, Assoc.M.Inst.C.E., Gas-Works, Widnes.
Tenders, endorsed "Gas and Water Pipes," must be addressed to the Chairman of the Gas and Water Committee, and delivered to the undersigned at the Town Hall, Widnes, not later than Noon on Tuesday, the 4th of April, 1893.
The Corporation do not bind themselves to accept the lowest or any tender.
H. S. OPPENHEIM, Town Clerk.
Town Hall, Widnes,
March 14, 1893.

BOROUGH OF WIDNES.

TO BUILDERS AND CONTRACTORS.

THE Corporation of Widnes are prepared to receive TENDERS for the construction of a BRICK and PUDDLE GASHOLDER TANK, 118 feet diameter and 23 feet deep.
Plans may be seen and copies of Conditions of Contract, Specifications, Bill of Quantities, and Schedule for Prices obtained on application to Mr. Isaac Carr, Assoc.M.Inst.C.E., Gas-Works, Widnes, by payment of One Guinea, which will be returned on receipt of a *bonâ-fide* tender.
Tenders, endorsed "Gasholder Tank," addressed to the Chairman of the Gas and Water Committee, must be delivered to the undersigned at the Town Hall, Widnes, not later than Noon on Tuesday, the 4th of April, 1893.
The Corporation do not bind themselves to accept the lowest or any tender.
H. S. OPPENHEIM, Town Clerk.
Town Hall, Widnes,
March 14, 1893.

TENDERS FOR COAL TAR.

THE Littleborough Gas Company are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Works from April 1, 1893, to March 31, 1894.

Tenders to be sent in to the undersigned not later than the 28th inst.

JOHN COCKCROFT,
Secretary and Manager.

Gas-Works, Littleborough,
March 8, 1893.

AMMONIACAL LIQUOR.

THE Gas Committee of the Mansfield Corporation invite TENDERS for the purchase of the AMMONIACAL LIQUOR to be produced at the Gas-Works during the Year ending the 25th of March, 1894.

Sealed tenders to be sent to the undersigned not later than Saturday, the 25th inst.

Further particulars may be had on application to the Manager.

R. J. PARSONS,
Town Clerk.

Mansfield, March 17, 1893.

TAR AND AMMONIACAL LIQUOR.

THE Gas Committee of the Padiham and Hapton Local Board invite TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR to be produced at the Gas-Works during the Year ending March 25, 1894.

Sealed tenders, addressed to the Chairman, Gas Committee, Local Board, Padiham, must be sent to me not later than Saturday, March 25, 1893.

For particulars, apply to the undersigned.

J. R. SMITH,
Clerk to the Board.

Padiham,
March 9, 1893.

BOROUGH OF MACCLESFIELD.

THE Gas Committee are prepared to receive TENDERS for the supply of the whole or part of 11,000 tons of the best Screened GAS COALS and 1000 tons of CANNEL, to be delivered free at Macclesfield, at such times and in such quantities as shall be ordered. Deliveries to commence on the 1st of July, 1893, and to be completed within a year.

Forms of Tender and Conditions may be had on application to the Engineer, Gas-Works, Macclesfield.

Tenders, sealed and endorsed, to be sent in not later than Saturday, the 22nd day of April, 1893, addressed to the Chairman, Gas Committee, Town Hall, Macclesfield.

The Committee do not pledge themselves to accept the lowest or any tender.

W. FREDK. TAYLOR,
Town Clerk.

March 13, 1893.

LLANDUDNO
IMPROVEMENT COMMISSIONERS.

TENDERS FOR GAS COAL.

THE Llandudno Improvement Com- missioners invite TENDERS for the supply of not less than 4500 tons of COAL, capable of producing a minimum of 9500 cubic feet of 17-candle Gas per ton, to be delivered, carriage paid, between the 1st of July, 1893, and the 30th of June, 1894, at the Llandudno Station of the London and North-Western Railway, in such quantities and at such periods as may be ordered from time to time.

Tenders, endorsed "Tender for Coal," to be sent to the undersigned not later than Monday, the 17th day of April next.

The Commissioners do not bind themselves to accept the lowest or any tender.

A. CONOLLY,
Clerk to the Commissioners.

March 15, 1893.

TENDERS FOR TAR.

THE Derby Gaslight and Coke Company are prepared to receive TENDERS for the purchase of the surplus TAR they will have for disposal during the Twelve Months ending March 31, 1894—viz., about 2100 tons.

The Company may dispose of the total surplus of approximately 2100 tons, or part thereof, in one or more Contracts, extending over Six or Twelve Months, as the Board may decide; but they do not bind themselves to accept the highest or other tender or tenders.

Tenders must be addressed to the Chairman of the Finance Committee of the Derby Gaslight and Coke Company, Friar Gate, Derby, endorsed "Tender for Tar," and delivered on or before Tuesday, the 28th day of March, 1893.

Further particulars may be had on application.

By order of the Directors,
RICHARD FISHER,
Secretary.

Derby Gas Office,
March 9, 1893.

SOUTH SHIELDS GAS COMPANY.

TO COALOWNERS.

THE Directors of the South Shields Gas Company invite TENDERS for the supply of 45,000 tons of Clean Unscreened GAS COAL, for delivery, as required, from June, 1893, to May, 1894, inclusive, into Craft and at the Company's Depôt, South Shields.

The Directors reserve to themselves the right of taking the Coal in one or more lots.

The lowest or any tender not necessarily accepted.

Further particulars may be obtained at the Gas-Works, on application to Mr. W. J. Warner, the Engineer.

Sealed tenders to be delivered to the undersigned not later than Wednesday Morning, the 29th inst., endorsed "Tender for Coal."

J. H. PENNEY,
Secretary.

Gas Offices: Chapter Row, South Shields,
March 20, 1893.

THE Local Board for the District of Atherton (near Manchester) invite TENDERS for the supply and erection at their Gas-Works of a STATION METER, adapted to pass 20,000 cubic feet of Gas per hour, with 14-inch Valves, Bye-Pass, &c.

Further information may be obtained from Mr. Thomas Newbigging, C.E., 5, Norfolk Street, Manchester.

Endorsed tenders, accompanied by detailed descriptions of the Meters offered, to be addressed to me, and sent so as to be delivered not later than Tuesday, March 28.

The lowest or any tender not necessarily accepted.

By order,
DANL. SCHOFIELD,
Clerk.

Local Board Offices,
Atherton, near Manchester.

GLASGOW CORPORATION GAS.

THE Gas Committee of the Corporation of Glasgow are prepared to receive TENDERS for the construction of Three Sets of PURIFIERS and IRONWORK of PURIFYING-HOUSE to be erected at their Dawsholm Gas-Works.

Copies of Specification and Forms of Tender may be obtained, and Plans seen, at the Engineer's Office, 45, John Street, Glasgow, on payment of One Guinea.

Sealed offers, marked "Tender for Purifiers," to be lodged with the Subscriber on or before Tuesday, the 28th curt.

The Committee do not bind themselves to accept the lowest or any tender.

J. D. MARWICK,
Town Clerk.

City Chambers, George Square,
Glasgow, March 16, 1893.

COUNTY BOROUGH OF STOCKPORT.
(GAS DEPARTMENT.)

TO ENGINEERS, ERECTORS, AND OTHERS.

THE Gas Committee are prepared to receive TENDERS for stripping and re-lathing a WROUGHT-IRON ROOF, and erecting three WROUGHT-IRON SMOKE SHAFTS on same at their Heaton Lane Works.

Drawings and Specification may be seen and all Information received on application to the Engineer, Mr. S. Meunier, Stockport.

Tenders, endorsed "Wrought-Iron Roof," and addressed to the Chairman of the Gas Committee, Gas-Works, Stockport, to be sent in on or before Four p.m., the 29th of March, 1893.

No tender will be accepted without satisfactory proof that the firm tendering pays the standard rate of wages and observes the standard number of hours.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
WALTER HYDE,
Town Clerk.

March 17, 1893.

DURHAM COUNTY LUNATIC ASYLUM,
SEDGEFIELD.

THE Visiting Committee of the Durham County Lunatic Asylum invite TENDERS for the construction and erection of a SINGLE-LIFT GASHOLDER, 60 ft. diameter by 20 ft. 6 in. deep, upon the Gas-Works Premises of the Asylum, near Sedgefield.

Plans and Specifications may be seen, and any further Information obtained, on application to Mr. William Ford, Gas Engineer, Stockton-on-Tees.

Tenders, sealed and endorsed "Tender for Gasholder," to be lodged with me on or before the 25th day of March, 1893.

The Visiting Committee do not bind themselves to accept the lowest or any tender.

By order,
ALFRED O. SMITH,
Clerk to Visiting Committee.

19, Elvet Bridge, Durham,
March 15, 1893.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is hereby given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office, on Wednesday, the 29th inst., at half-past Twelve o'clock precisely, to transact the usual Business, and to declare the Dividend for the Half Year ended the 31st of December last.

Notice is hereby also given, that the Transfer Books of the Company will be closed on the 18th and re-opened on the 30th inst.

By order of the Court of Directors,
FREDERIC LANE LINGING,
Secretary.

Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.,
March 10, 1893.

CRAYS GAS COMPANY.

ADDITIONAL CAPITAL.

NOTICE is hereby given that, under the powers conferred by the Crays Gas Order, 1884, the Directors are prepared to receive TENDERS for the purchase of TWO HUNDRED ORDINARY SHARES, of the nominal value of £10 each.

The Shares tendered for will be entitled to a Standard Dividend not exceeding 7 per cent., subject to variation in accordance with a Sliding Scale as in the said Order is provided.

Conditions of Sale and Forms of Tender may be obtained upon application to the undersigned.

Tenders must be sent in not later than Tuesday, the 4th of April, 1893, at Five o'clock p.m., addressed to the undersigned, at the Company's Works, St. Mary Cray, Kent.

W. B. MIMMACK,
Secretary.

St. Mary Cray, Kent,
March 1, 1893.

Price 2s. per dozen, or 10s. 6d. per 100, post free.

CONSPIRACY and Protection of Pro- perty Act. It is required, under a Penalty of FIVE POUNDS, that a Printed Copy of the 4th Section of this Act shall be posted up at all Gas-Works, in a conspicuous place, where the same may be conveniently read by the persons employed thereat.

Printed copies of this Section, in large type, on broad sheets, may be obtained of WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

*** *The Act extends to Scotland and Ireland.*

Now Ready, Price 6s., Cloth Bound.

THE CHEMISTRY OF ILLUMINATING GAS,

By

NORTON H. HUMPHRYS, Assoc. M.Inst.C.E., F.C.S.

This work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas; Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation; Condensation; and Purification.

LONDON:
WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

NEW **BOX'S** PATENT

RETORT-LID FASTENER.

CANNOT GET OUT OF ORDER.
DOES NOT DAMAGE LIDS.
SIMPLE & EFFECTIVE.
CHEAP & DURABLE.

For Prices and Particulars, apply to

W. W. BOX,
GAS-WORKS, CRAYFORD, KENT.

[*Illustrated Description in* JOURNAL, *Vol. LX., p.* 346.]

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

NIDDRIE CANNEL

A FIRST-CLASS CANNEL COAL,

Yielding a large volume of rich Gas, and fully 60 per cent. of first-class Coke.

FOR ANALYSIS, PRICE, AND ALL OTHER PARTICULARS, APPLY TO

The Niddrie & Benhar Coal Co., Ltd.,
4, York Buildings, Queen Street,
EDINBURGH.

Telegrams: "BENHAR, Edinburgh."

HOLMSIDE GAS COALS.

(Wrought out of Holmside and South Moor Collieries.)

PRESENT production over 3200 tons per working day. Area of coal about 5000 acres, including the largest remaining workable proportion of pure HUTTON SEAM GAS COAL. Analysis of HOLMSIDE GAS COAL *in bulk as shipped* gives 10,500 cubic feet of Gas per ton, of an Illuminating Power of 16½ candles. The Sulphur is about 1 per cent., and the Ash 1¾ per cent. The Coal cokes well, and leaves about 70 per cent. of excellent Coke. To show the progress of HOLMSIDE COALS, it may be mentioned that the quantity carbonized by the London Gas Companies in 1885 was about 200,000 tons; whereas the present consumption of HOLMSIDE COALS in London alone is at the rate of over

400,000 Tons per Annum.

Full particulars on application to

MR. MARK ARCHER,
HOLMSIDE AND SOUTH MOOR OFFICES,
NEWCASTLE-ON-TYNE.

THOMAS ILLINGWORTH,

NORTH DEAN CHEMICAL WORKS,
Near HALIFAX,

MANUFACTURER OF SULPHURIC ACID
OF EXTRA QUALITY FOR MAKING
WHITE SULPHATE OF AMMONIA.

TAR, LIQUOR, AND SPENT OXIDE
Purchased for Cash against Delivery.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.,
Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton . .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Danish Gas Company of London, Ipswich Gaslight Company, Devonport Gas Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For prices, &c., apply to the

HARTON COAL COMPANY,
LIMITED,
Newcastle-on-Tyne.

W. H. PARKINSON,
FITTER.

AUG. KLÖNNE,
DORTMUND (GERMANY).

REGENERATIVE FURNACES.

Unsurpassed in
Efficiency, Economy, Durability, and Easy Working.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887, for

CANNEL & COAL.

TYNE
BOGHEAD CANNEL.

Yield of Gas per ton	**13,155 cub. ft.**
Illuminating Power	**38·22 candles.**
Coke per ton	**1,301·88 lbs.**

EAST PONTOP GAS COAL.

Yield of Gas per ton	**10,500 cub. ft.**
Illuminating Power	**16·3 candles.**
Coke	**70 per cent.**

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to
THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE,
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C.

THORNLEY GAS COALS

WORKED BY THE
WEARDALE IRON AND COAL COMPANY, Ld.
OUT OF THEIR
THORNLEY AND WHEATLEY HILL COLLIERIES.

The Analysis made by Messrs. J. and H. T. PATTINSON, Public Analyst for Northumberland, gives 10,500 cubic feet of Gas per ton, with an Illuminating Power of 16·3 Candles and 67·3 per cent. of Coke. The following is a working Analysis made of these Coals by the Falmouth Gas Company:—

[COPY.]
FALMOUTH GAS COMPANY,
Offices: *Church Street, Falmouth,*
January 25th, 1893.

Messrs. the
WEARDALE IRON & COAL COMPANY, LTD.,
NEWCASTLE-ON-TYNE.

GENTLEMEN,

From the Cargo of **THORNLEY GAS COAL,** received early this month from you, I have Carbonized at these Works, during a period of thirteen consecutive days, 151$\frac{15}{20}$ tons of the Coal, mixed with 9$\frac{6}{20}$ tons of Cannel Shale (or about 6 per cent.)

The Make of Gas during the above period was 1,624,000 cubic feet.

The whole of the Gas was made from four beds of sixes (24 mouthpieces); each charge being of six hours' duration.

Gas made: 1,624,000 cubic feet.
Coal Carbonized: 151$\frac{15}{20}$ tons.
Cannel Shale: 9$\frac{6}{20}$ tons.
Make per ton of Coal and Cannel Carbonized: 10,082 cubic feet.
Coke per ton (of good quality): 13$\frac{1}{4}$ cwt.

The ILLUMINATING POWER averages from 11 daily tests, **16·54 CANDLES,** which was ascertained by burning the Gas at the rate of 5 cubic feet per hour in a certified Letheby Photometer, fitted with a Standard Argand, each Candle consuming 120 grains of Sperm per hour.

Yours faithfully,
J. WM. BUCKLEY,
Engineer and Manager.

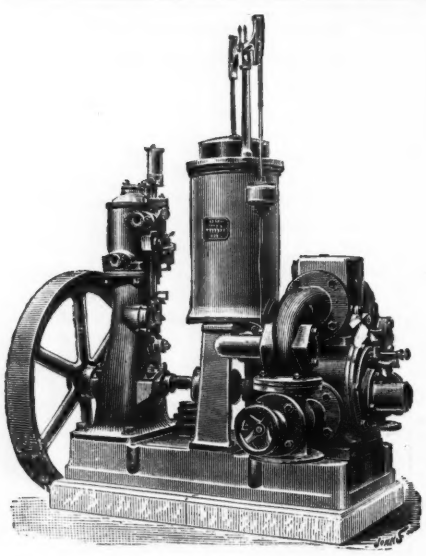
For Price, &c., apply to the
WEARDALE IRON & COAL Co., Ld.,
QUAYSIDE, NEWCASTLE-ON-TYNE.

JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of
ALDWARKE MAIN CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 feet of 19-candle gas per ton.
Weight of illuminating power in pounds of sperm, 820·80. Very free from impurities.
Telegrams: "ATLAS SHEFFIELD."



WALLER'S PATENT COMBINED GAS ENGINE AND EXHAUSTER

WITH
Disc-Valves, Automatic Bye-Pass Valve, Throttle-Valve, and Regulator,
COMPLETE ON ONE BASE PLATE.

Designed chiefly for sizes from 500 to 15,000 feet per hour.
CAN BE SEEN IN ACTION AT ADDRESS BELOW.

EXHAUSTERS OF ANY SIZE
COMBINED WITH GAS-ENGINES (now made to vary in speed).

ENGINES & EXHAUSTERS RUN AT DIFFERENT SPEEDS.
Waller's Washer-Scrubber with Wood Clusters.
ELEVATING AND CONVEYING MACHINERY FOR COAL, COKE, &c.

G. WALLER & CO.,

58, PARK STREET, SOUTHWARK (SURREY SIDE OF SOUTHWARK BRIDGE.)

TROTTER, HAINES, & CORBETT,
Brettell's Estate
FIRE-CLAY & BRICK WORKS,
STOURBRIDGE.
Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
Proprietors of
BEST GLASSHOUSE POT & CRUCIBLE CLAY.
Shipments Promptly and Carefully Executed.

THE SILICA FIRE-BRICK COMPANY,
OUGHTIBRIDGE, near SHEFFIELD,
MANUFACTURE
SILICA BLOCKS, BRICKS, AND CEMENT
OF SUPERIOR QUALITY
FOR GAS-FURNACES.
Trade Mark: "SILICA."
These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their
GREATER DURABILITY
Strongly recommended where EXCESSIVE HEATS have to be maintained.

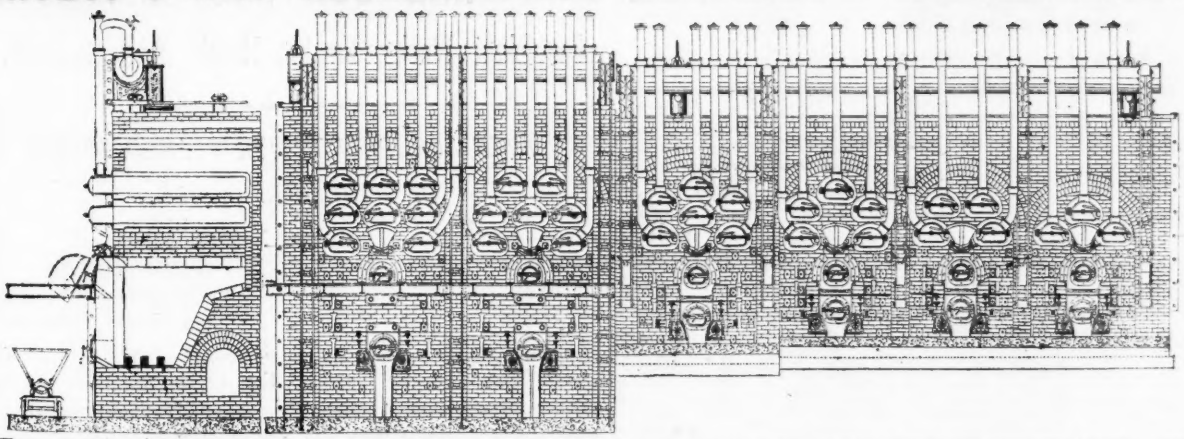
UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

T. B. KITTEL, SHEFFIELD.
CONTRACTS FOR SUPPLIES OF ANY OF THE PRINCIPAL
ENGLISH & SCOTCH CANNELS.
REAL SILKSTONE GAS COAL
ANALYSIS AND PRICES ON APPLICATION.
T. B. KITTEL, SHEFFIELD.

JAMES OAKES & Co.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.
Manufacture and keep in Stock at their Works (also large stock in London)
PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas Water, Railway, Telegraph Chemical, Colliery, and other Companies.
NOTE. — Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts, and covers, and rendering leakage impossible.

THOMAS TURTON AND SONS, LIMITED,
Sheaf & Spring Works,
SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.
London Office:
90, CANNON STREET, E.C.

HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE ADAPTED TO THE REQUIREMENTS OF ALL GAS COMPANIES AND GAS CORPORATIONS, AND HAVE ALREADY BEEN EXTENSIVELY ADOPTED. THEY ARE ERECTED UPON BOTH THE WORKING-STAGE AND SHALLOW-CHAMBER SYSTEMS, AND EQUALLY SATISFACTORY RESULTS ARE GUARANTEED IN BOTH CASES.

THE SETTINGS HAVE ATTAINED TO A MEASURE OF SUCCESS AND POPULARITY QUITE UNEQUALLED BY THAT OF ANY OTHER WITHIN THE SAME SPACE OF TIME. THE WORKING RESULTS OBTAINED, AND THE GENERAL SATISFACTION GIVEN, ARE DECLARED IN EVERY CASE TO EXCEED, AND IN MOST CASES CONSIDERABLY EXCEED, THE PATENTEE'S GUARANTEE. THE CONSTRUCTION AND WORKING OF THE PATENT PRODUCER AND THE PATENT CHARGING APPARATUS FOR SAME ARE ABSOLUTELY UNIQUE AND UNRIVALLED, AND ARE THE DELIGHT OF EVERY STOKER; WHILE IN EVERY OTHER PARTICULAR THEY SECURE THE HIGHEST RESULTS ATTAINABLE BY ANY REGENERATIVE SYSTEM, AND AT A MINIMUM OF COST.

Drawings and Specifications are furnished for the complete erection of Ovens, with or without Retort and Bench Mountings, or complete erection undertaken if required, and carried out by specially Trained Workmen.

Further particulars may be obtained on application to the Patentee's Agents: C. M. HAMILTON, 5, Stewart Street, Shawlands, Glasgow; J. E. FISHER, Stourbridge, and from R. F. HISLOP (son of Patentee), Gas-Works, Paisley.

HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE is a *Sine quâ non*
TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED, AND AFFORDING THE HIGHEST SATISFACTION.

SPENT LIMES NO LONGER WASTE PRODUCTS
Under G. R. HISLOP'S PATENTS.
All Spent Limes are most effectually, economically, and continuously recovered at from one-third to one-half the cost of New Lime. The results are a surprise to all who have inspected the process, and are entirely satisfactory to all now using it.
Descriptive Pamphlets and Terms from Agents as above.

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effecting a great saving of time labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, 22, Alwyne Road, Canonbury, LONDON, N.

Prices are Reduced.

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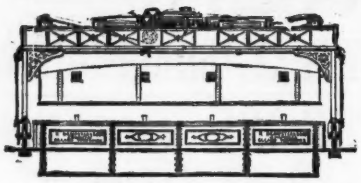

PURIFIERS (MACHINED JOINTS)

PURIFIERS.

ELLAND.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on application

JAMES WHITE & CO., LTD.,

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Manufacturers of Special

FIRE-BRICKS, FIRE-CLAY, & FURNACE CEMENT.

FOR GAS FURNACES our GANNISTER and SILICA FIRE-BRICKS are acknowledged to be the best and most durable in the Market.

GANNISTER and SILICA FIRE-CLAY guaranteed of the Purest Quality.

FURNACE CEMENT specially made for repairing Furnaces and stopping Cracks.

ANALYSIS AND REFERENCES ON APPLICATION.

MEIKLEJOHN'S PATENT

Improved Slide-Valve Anti-Dip.

Is perfectly reliable in action, and requires no attention. Has all the advantages of the Dip and Anti-Dip combined.

Is cheap and easily fixed to any form of main.

Will be found the most efficient appliance of the kind yet introduced.

Further particulars and price from

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CAST-IRON PIPES

FOR GAS AND WATER.

Pipes, One to Six inch Bore, kept in Stock. Also a very large assortment of all sizes of Bends, T-pieces, and Specials ready for despatch on receipt of Order.

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FOR GAS, WATER, AND STEAM.

TELEGRAMS: "PIPES GLASGOW."

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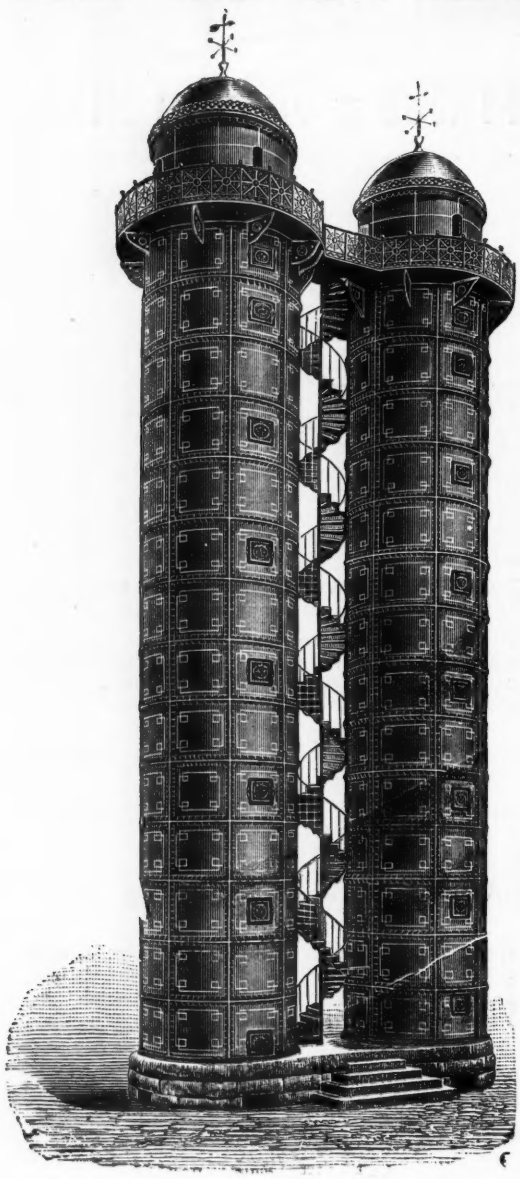

ENGINEERS, IRONFOUNDERS,

AND CONTRACTORS,

Gas-Plant Works, Newton Heath, MANCHESTER.

TOWER SCRUBBERS WITH PLANED JOINTS OF HANDSOME DESIGN.

Messrs. R. & J. D. wish to specially direct the attention of Gas Managers to the larger quantity of Ammoniacal Liquor or Sulphate **made** by their Scrubbers than by any of the numerous Rotary and other Machines now upon the market. From 28 lbs. to 34 lbs. of Sulphate are produced (per ton of coal carbonized) by their Scrubbers; whereas 20 lbs. to 22 lbs. is as much as can be got by the Machines. Gas Managers with low yields of Sulphate should not rest satisfied (because Ammonia does not show on test papers) until they are getting all the Ammonia it is possible to make. It should be remembered that each gallon of liquor, or 1 lb. of Sulphate, is worth about 1d.; thus, when every ton of coal carbonized is multiplied by 6d., 8d., 10d., or 1s., from increased yield of Sulphate on the quantity of coals used per annum a very large extra profit is made. Irrespective of the profit made from the increased yield of Ammonia, these Scrubbers utilize the Ammonia as a purifying agent, and very considerably reduce the amount of work to be done in the purifiers.

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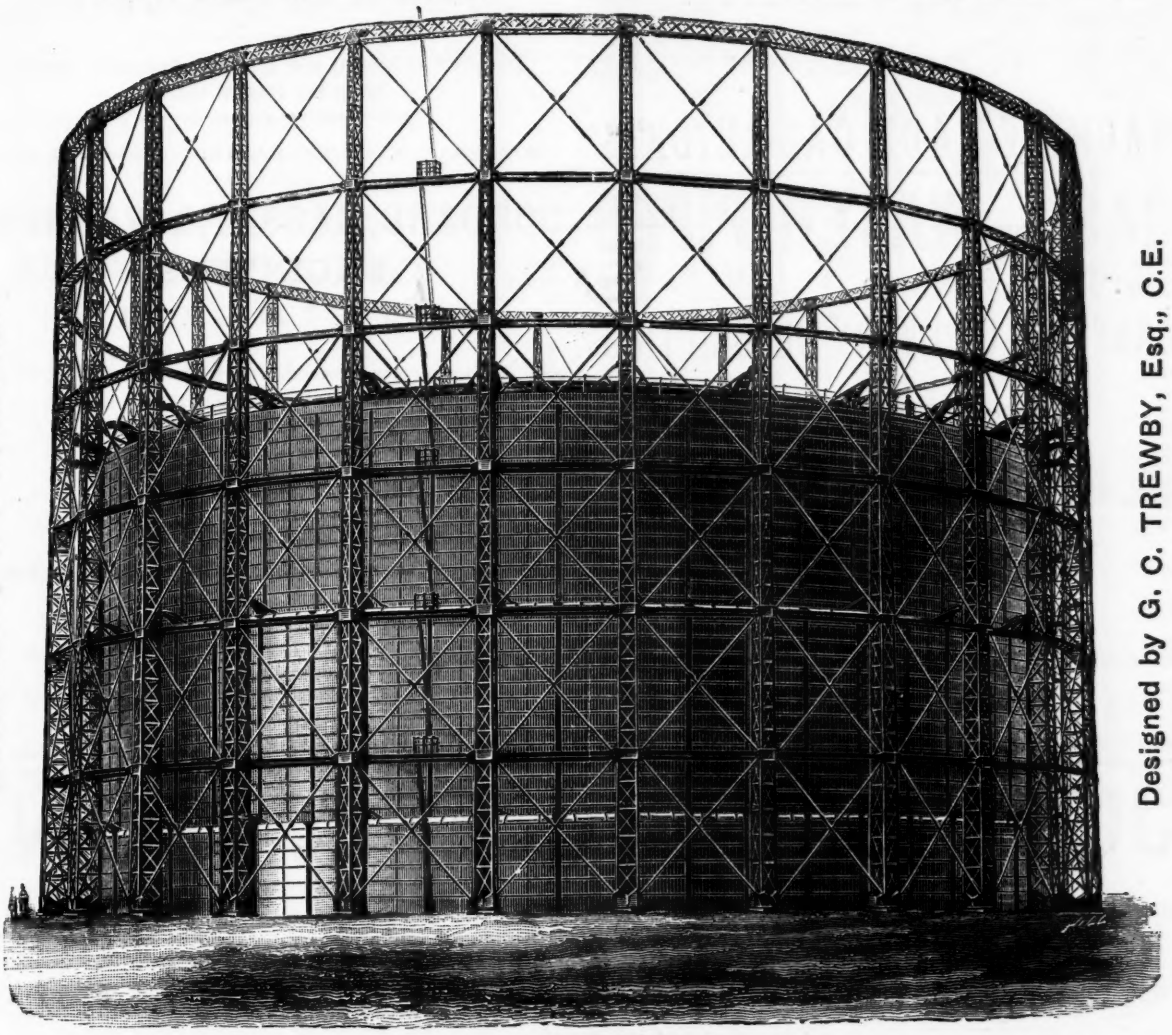
"FORTRESS DONNINGTON." "FORTRESS LONDON."—Telegraphic.

Constructed by C. & W. WALKER.



Designed by G. C. TREWBY, Esq., C.E.

Four-Lift Gasholder, nearly 200 feet high, and 8 million Cubic Feet capacity, recently erected by us for The Gaslight and Coke Company, London.

PURIFYING MACHINES.

PURIFIERS. SULPHATE PLANT.

Weck's Centre-Valve.

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9, Victoria Street, London, S.W.

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Incorporated with the Leeds Fire-Clay Company, Ltd.,
WORTLEY FIRE-CLAY WORKS,
Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT
MACHINE-MADE GAS-RETORTS.

GAS AND WATER PIPES
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CASTINGS OF EVERY DESCRIPTION.

MANUFACTURED BY THE

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TRADE	TELEGRAMS:	LONDON AGENTS:
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GODDARD, MASSEY, & WARNER'S
IMPROVED
Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICE, APPLY TO

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The Apparatus has been supplied to the following Firms—
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CHANCE BROTHERS, OLDBURY (Four Apparatus).
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NETHAM CHEMICAL CO., Limited, BRISTOL.
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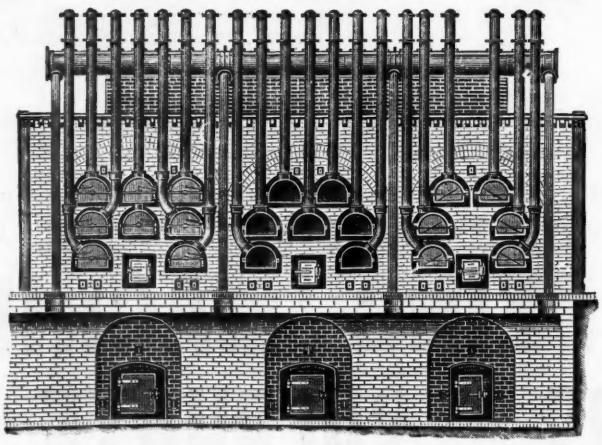
BUILDERS AND ERECTORS OF EVERY DESCRIPTION OF OVENS, BENCHES, KILNS, FURNACES, &c.



RETORT SETTERS,
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REGENERATOR AND GENERATOR FURNACES ON DRAKE'S, FRITH'S SIEMENS'S, KLONNE'S, HASSE'S VALON'S, SOMERVILLE'S, PONSARD'S and other Principles.

INCLINED RETORTS
GASEOUS FIRING A SPECIALTY.

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THE CHARLES HUNT GAS WASHER

(HUNT'S PATENT).

By this Washer, which performs the functions of both a Washer and Scrubber, any tarry matters are intercepted, and the whole of the Ammonia is removed from the Gas, together with a high percentage of Carbonic Acid and Sulphuretted Hydrogen.

This is effected by causing the Gas to pass in finely-divided streams through a series of light seals, formed by inverted troughs, having their perforated sides submerged in liquid, and placed one above another. Clean Water being introduced at the top and flowing from tier to tier in the opposite direction to the Gas, leaves the Washer at the bottom as strong Ammoniacal Liquor.

The lower tiers perform the function of a most efficient Tar Extractor, removing from the Gas all traces of tarry matters.

The total back pressure due to this apparatus does not exceed about 7 ins.

The advantages claimed for the Washer are: **It is entirely automatic in action**, depending only upon a constant supply of clean water, proportionate in quantity to the volume of Gas passing. **It has no moving parts**, and thus **no driving machinery or power** is required other than a slight extra duty thrown on the Exhauster. **It is economical in first cost**; there is **practically no wear and tear**; and consequently **no expense for maintenance. It is compact in form, occupies little space, and requires no heavy foundations.**

For prices and particulars apply, stating capacity required, to the Sole Makers, Messrs. S. CUTLER & SONS.

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MORRIS & CUTLER'S PATENT CONDENSER

IS IN USE AT OVER 80 GAS-WORKS.

It is Independent of Atmospheric Temperature,
Prevents the Formation of Naphthaline,
Is Readily Adjusted to Condense varying makes of Gas,
Acts as a Frictional Tar-Separator,
Efficient, Compact, Convenient, Ornamental.

Sole Makers, Messrs. S. CUTLER & SONS.

GASHOLDERS of EVERY SIZE and TYPE.

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IMPORTANT TO ENGINEERS AND GAS COMPANIES.

A NEW CARBURETTOR FOR ENRICHING GAS IN BULK.

The Carburettors have been doing practical work for the past two years; in many cases doing all the enrichment without the use of Cannel or other rich Coals. The South Metropolitan Gas Company have these Enrichers at all their Stations. The Gaslight and Coke Company have had them in use at some of their principal Works for two years past; and several more are now being fixed at their other Stations. The Carburettors are also in use at several Suburban and Provincial Gas Companies' Works.

FOR PRICES AND FULL PARTICULARS, APPLY TO

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

(FRANK W. CLARK, Engineer and Manager)

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RETORT WORK

HORIZONTAL, INCLINED, REGENERATIVE, GENERATIVE, OR FLOOR-LEVEL SETTINGS.

J. & H. ROBUS,

ENGINEERS AND CONTRACTORS,

MANSION HOUSE CHAMBERS, 20, BUCKLERSBURY, LONDON, E.C.

ARE PREPARED TO ENTER CONTRACTS

FOR EXTENSIONS OR RENEWALS OF THE ABOVE WORK DURING THE ENSUING SEASON.

PLANS, SPECIFICATIONS, AND ESTIMATES SUBMITTED

FOR EXTENSIONS AND RENEWALS OF EVERY DESCRIPTION.

Contractors for the Erection of Gas-Works complete, including Gasholder Tanks of all sizes and Main Laying.

THE HORSELEY CO., LTD., TIPTON, STAFFORDSHIRE,

MAKERS OF

GAS HOLDERS & GAS PLANT,

PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES

PIPES, LAMP PILLARS. RETORT-FITTINGS, ETC.

ALSO ALL KINDS OF

STRUCTURAL IRON

AND STEEL WORK.

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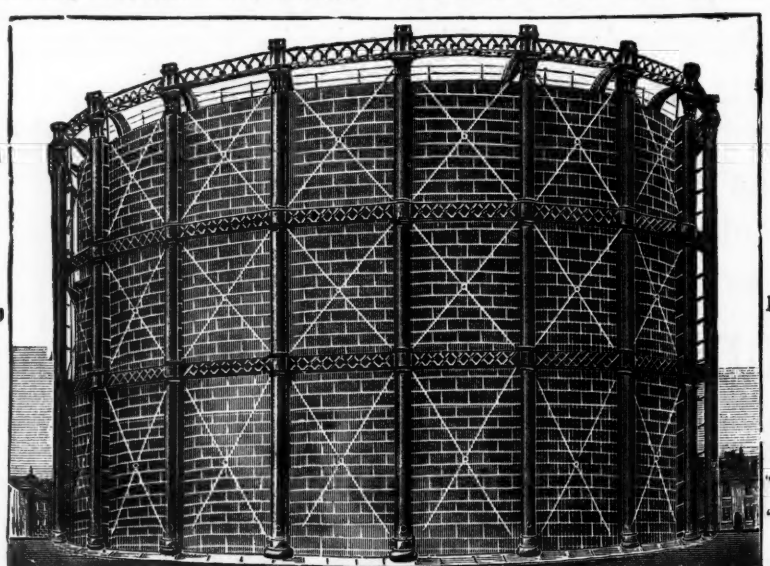

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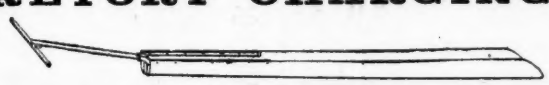
MANUFACTURERS OF GASELIERS IN GLASS AND METAL.

STEEL SCOOPS FOR RETORT CHARGING.



Scoops supplied with or without handles, and of any dimensions or shape required.

HENRY SYKES, Engineer,
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TELEGRAPHIC ADDRESS, "GAS LEEDS."

CLAYTON, SON, & Co.

LIMITED,
LEEDS,
MAKE

RETORT LIDS

OF ALL FORMS AND SHAPES IN IRON OR STEEL BY SPECIAL HYDRAULIC MACHINERY.

LONDON OFFICES 60, QUEEN VICTORIA STREET, E.C.

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S. PONTIFEX & CO.,
GAS and WATER ENGINEERS,

Manufacturers of and Contractors for the Maintenance of

PUBLIC LAMPS & LANTERNS;

GLASS—Flint, Opal, and Bent in Stock, and Cut to Sizes.

WELL LAMPS, STREET NAME TABLETS,

LAMP COLUMNS, HEAD IRONS, PUTTYLESS LAMPS

LANTERNS COCKS, REGULATORS,

Improved High-Power Lanterns for Lighting Street Refuges and Open Spaces.

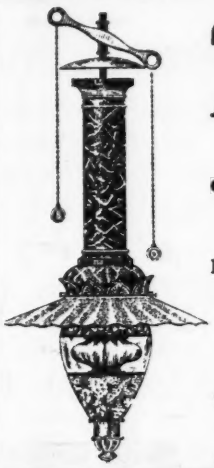
BROWN'S PATENT
LAMPLIGHTERS' TORCHES.

PROPRIETORS AND MANUFACTURERS OF
BOX'S PATENT
PUTTYLESS STREET LAMP.

This Lamp may be supplied fitted with clear opal, or ribbed glass, *as also with enamel tops* if required. The necessary fittings for altering existing Lamps to this system can be supplied at moderate prices.

S. PONTIFEX & CO., 22, COLEMAN ST., LONDON.
Works: 18, STEPHEN STREET, TOTTENHAM COURT ROAD, W.

The Climax of Regenerative Gas Lighting!!



THE
"VERTMARCHE"
A 280-CANDLE POWER PLAIN IRON LAMP,
CLASS A— 55/-
LIGHT for LIGHT
less than half the price of any other Regenerative Lamp.

Manufactured in England by
HENRY GREENE & SONS,
153 & 155, CANNON STREET,
LONDON BRIDGE, E.C.

PARTICULARS AND PRICES FREE. AGENTS WANTED.

BARROWS & Co., Ltd.,
ENGINEERS,
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(Late James & Son, Cheltenham).

GAS TAR & AMMONIA WATER VAN.

JOSEPH CLIFF & SONS,
INCORPORATED IN
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WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.

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16, Lightbody Street.

LEEDS:
Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

EQUILIBRIUM GOVERNORS, THE GASLIGHT AND COKE COMPANY'S VALVE-ROOM, STOKE NEWINGTON.

(TESTIMONIAL.)

THE GASLIGHT AND COKE COMPANY, 146, *Goswell Road, E.C., Jan.* 5, 1893.

GENTLEMEN,—In reply to your inquiry as to the working of the 36-inch and 24-inch Governors (double cone and equilibrium) recently erected by you at the new Valve-Station of this Company, situated at Stoke Newington, I beg to inform you they are highly satisfactory in their working.

The gas governed is supplied through a high-pressure pumping-main; and, notwithstanding the great fluctuations in the initial pressure, owing to so many stations pumping and shutting off alternately, the construction of your Governors enables a perfect equilibrium to be maintained, and being acted upon themselves by outlet pressure only, they stand the most severe tests to perfection.

I shall be happy to answer any questions, or show the Governors to Engineers contemplating their erection,

I am, Gentlemen, Yours faithfully,

(Signed) G. F. L. FOULGER, Distributing Engineer.

MESSRS. W. PARKINSON AND CO.,
Cottage Lane, City Road, E.C.

W. PARKINSON & CO., LONDON, BIRMINGHAM, MANCHESTER.

[See also Advt., p. 494.

London: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at No. 11, Bolt Court, Fleet Street in the City of London.—Tuesday, March 21, 1893.